NELSON

EDINBURGH

THE BOOK OF DIET

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LONDON, EDINBURGH, DUBLIN, LEEDS, PARIS
LEIPZIG, MELBOURNE, AND NEW YORK

[1913]

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THE BOOK OF DIET.

Chapter I.

THE CHEMISTRY AND PHYSIOLOGY OF NUTRITION.

Food Constituents—Digestion and Absorption of Food—Food Requirements and Factors modifying Them.

Introduction.—All animate nature, both animal and vegetable, is constantly changing. The tissues of plants and animals are continuously built up and at the same time gradually broken down by a process of wasting. The wasted tissues have to be replaced, and this is effected through the food we eat. Constant chemical changes are involved in these processes, these chemical changes supplying a large amount of energy, which produces both body heat and work.

In the human body the rate of change varies in the different organs and tissues according to age and activity. Thus the rate of growth from infancy to youth and on to manhood is enormous; in adult life, growth and repair take place much more slowly. The liver and other digestive glands are in a chronic state of rapid change, as they are intimately concerned in the chemical processes involved in breaking down the food-stuffs. The muscles of the body are also

rapidly changing, as they are so much concerned in muscular exercise. The changes in some of the bodily structures can readily be observed, notably in the nails and hair, which require to be cut on account of their growth. The superficial layers of the skin are continually being shed in the form of fine branny scales; similarly, the teeth develop, remain for a time, and then decay.

The existence of chemical changes is further shown by the waste products. Every human being gives off a large amount of carbonic acid and water from the lungs by respiration; a large amount of water containing waste products (urea) in solution is daily excreted by the kidneys, and other waste products are discharged along with the indigestible food residue in the fæces. The chemical changes involved in the processes of growth and repair go on incessantly, and food is essential for this growth and repair. If no food be taken, the chemical changes still go on, the tissues of the body being drawn on by the blood for its nutritive material, with the result that emaciation sets in and death results from starvation.

The question therefore arises as to the best means of supplying the materials necessary for the growth and repair of the tissues, and this involves the study of food and feeding. A food may be defined as anything which when taken into the body is able (1) either to build up or repair the tissues; or (2) to supply the material for the production of heat and muscular work.

A true food must be either a tissue builder or a source of potential energy. There are other substances used as food which are, strictly speaking, not true foods, although they are useful in nutrition—for example, tea, coffee, alcohol, and condiments.

All foods are chemically complex substances, and have to be subjected to digestive processes in order to break up the

complex substances into simple elements capable of being absorbed by the blood and tissues. These simple elements are in turn abstracted from the blood by the tissue, each tissue taking from the blood the particular element which it requires. At the same time the waste products from each tissue pass into the blood stream, and are excreted by the kidneys. If not excreted as rapidly as they are formed, these waste products accumulate in the tissues and act as toxins (poisons). See p. 269.

As stated above, all foods are chemical substances. They contain, in addition to the nutritive elements proper, a more or less non-nutritive or indigestible material, which is of no value as a food and is at once eliminated. The white of eggs, for instance, is an example of a food which can be almost completely digested and utilized as food, whereas the fibrous parts of many vegetables are very imperfectly digested, and the indigestible residue is at once excreted by the bowels in the fæces. This indigestible material is of value as ballast in promoting evacuation of the bowels.

THE CONSTITUENTS OF FOODS.

All foods are built up of the following five nutritive constituents in different proportions. These are spoken of as aliments or nutritive principles.

- Organic
  - Proteins—for example,
    - Casein of milk and myosin of meat.
    - Albuminoid—for example, gelatine.
  - Carbohydrates—for example, sugar and starch.
  - Fats—for example, butter and cream.
- Inorganic
  - Mineral matter—for example, sodium, potassium, calcium, magnesium, iron, phosphorus, sulphur, chlorides.
  - Water.

The proteins contain nitrogen, carbon, hydrogen, oxygen, and a small amount of sulphur. The carbohydrates and fats differ from the proteins in containing no nitrogen; they contain carbon, hydrogen, and oxygen only. All foods, therefore, are composed of these nutritive constituents in different proportions. Some contain all the five aliments, others contain two or three only. For example, lean flesh meats contain a very large proportion of proteins or nitrogenous elements and only a very small proportion of carbohydrates and fats; potatoes, sugar, and arrowroot consist almost entirely of carbohydrates and water; butter and cream consist almost entirely of fat. Some foods, such as milk, eggs, and bread contain all five nutritive principles in fair amount, carbohydrates however largely predominating in the case of bread. Careful observation and experiment have shown that for growth and the preservation of health the three food-stuffs —protein, fat, and carbohydrates—must be taken in certain relative amounts. There is, however, no food that contains them in the necessary proportion, hence the necessity of having recourse to a mixed diet. Milk is a perfect food in infancy, but in adult life the enormous bulk of milk required makes it an unpracticable food.

Each food-stuff has a particular value in nutrition: the building material is supplied by the proteins, mineral salts and water, which are spoken of as tissue builders. Fats, carbohydrates and albuminoids are not tissue builders, but are sources of heat and energy. The second great function of the food, the supply of heat and energy, is shared by all the organic food-stuffs, such as proteins, fats, and carbohydrates. These substances are able to supply heat and energy in virtue of their capability of undergoing oxidation in the tissues. In the body the proteins, fats, and carbohydrates undergo oxidation, the oxygen necessary for their

combustion being taken in with the inspired air. The oxidation processes are attended by the liberation of energy, which may take the form of heat or work. Fats require the greatest amount of oxidation, and are thus the most important fuel food. It is owing to its great value as a heat producer that fat forms such a prominent article of food in the dietaries of the inhabitants of the Arctic regions.

A short detailed survey of the five nutritive principles may now be made.

I.—Protein.

Protein is the term applied to the nitrogenous element in the food. There are various varieties of this substance—for example, in meats, eggs, and milk from the animal kingdom, and in beans and peas from the vegetable kingdom. Analyses show that they all contain much the same amount of nitrogen, carbon, hydrogen, salts, and water. The all-important point regarding proteins is that they perform the same function in nutrition by supplying building material, and after the growing period is over it is largely a matter of indifference whether animal or vegetable protein is taken. The chief proteins are :—

Casein is the chief protein in milk; when separated from the milk by the addition of rennet it constitutes the curd of milk from which curds are made.

Myosin is the chief protein in meat.

Albumin is found in its purest form in white of egg, but is also present combined in many animal and vegetable foods. Albumin is a fluid substance that solidifies when heated to 160° F. This property of albumin is exemplified in a hard-boiled egg, also in the skin that forms on the surface of boiled milk, and in the granular portion that forms the lower layer in a cup of beef-tea.

Gluten and Legumin are the best known vegetable proteins; gluten is the chief protein in wheat; legumin is a protein derived chiefly from peas, beans, and lentils.

Gelatine is a nitrogenous substance closely allied to albumin. It differs from other proteins, however, in not being able to build up the tissues. If gelatine be given along with albumin it is utilized by the tissues and less albumin is needed; and on this account gelatine is spoken of as a protein sparer. This property is of value in the feeding of fevers and other conditions.

II.—Carbohydrates.

This class of food-stuff includes all forms of starches and sugars and some gummy substances. They are found very abundantly in potato, rice, corn-flour, sago, barley, and wheaten flour. Sugars are present in fruits, honey, sugar-cane and beetroot. The special rôle of carbohydrates in nutrition is to act as a source of heat and energy.

III.—Fats.

This class contains all the fatty and oily foods. They may be derived either from the animal kingdom (cream, butter, suet), or from the vegetable kingdom (olive oil). The edible fats are composed of stearin, palmitin, and olein. These differ from one another in their melting point, olein being liquid at ordinary temperature and stearin solid. Beef and mutton suet are a mixture, chiefly composed of stearin, while olive oil consists almost entirely of olein.

The chief use of fat is to generate heat at the time of consumption or to form a reserve store in the body. If just a sufficient amount is taken for the needs of the body it is converted into carbonic acid gas and water, in which form

it leaves the body. An excessive consumption of it in the food invariably leads to the accumulation of fat in the body. The amount of fat required by the body is dependent upon (1) muscular exercise. If a sufficient amount of fat is not taken, heat production during muscular exercise takes place mainly at the expense of the albuminous tissues, with the result that the muscles waste and a loss of weight results. The combustion of fat is also dependent on (2) the external temperature. With a low temperature more fat is oxidized and more heat is evolved. In winter there is more rapid loss of heat from the surface and there is more active internal heat production than in the summer, when the external temperature is higher. In cold climates more fat must be consumed than in warmer zones; this explains why the Eskimos eat enormous quantities of fat. Fat is also stored in the body and is available for future use.

If it is desired to increase the amount of fat in the body, a fair amount must be taken in the food, together with a plentiful supply of carbohydrates. In young children the fat supply is more essential, deficiency of fat in the food being a fault often met with in the artificial feeding of infants. The uses of fat may be summarized as follows:—

(1) Supplies muscular energy; (2) supplies heat; (3) forms a reserve store; (4) prevents waste of tissue.

IV.—Mineral Salts.

Mineral salts are of very great importance in nutrition. This will be readily understood if we bear in mind that the tissues, on analysis, yield 5 per cent. of ash. Death occurs in a few weeks if salts are cut out of the diet. The two most important salts are calcium phosphate, which enters largely into the composition of bones; and sodium chloride,

which occurs in all the tissues and fluids of the body. Mineral substances are of great value as tissue builders, and indirectly are also sources of energy. We have no very precise knowledge as to the exact amount required daily, but we know that an ordinary mixed diet contains sufficient for the body requirements. Salts pass into the blood, as a rule, unchanged by digestion. The chief mineral constituents are calcium, sodium, potassium, magnesium, and iron; phosphorus, chlorine, and sulphur; traces of silica, iodine, fluorine. The chief uses of the salts may be summarized as follows :—

1. They enter into the composition of the tissues—for example, the bones and teeth.
2. They subserve special functions, such as the iron in hæmoglobin, the colouring matter of the blood, and sodium chloride in the production of hydrochloric acid of the gastric juice.

The order in which food stands as regards richness in salts is as follows :—

(1) Pulses and cereals; (2) vegetables; (3) meat; and (4) fruits and nuts.

Calcium.—Foods rich in lime are milk, eggs, cereals (especially rice), vegetables (especially asparagus and spinach), and drinking water, when that is of the hard variety. Foods poor in lime are meat, fish, potatoes, and fruits. An adequate supply of foods rich in lime is essential, more especially in the growing period. Deficiency of lime leads to softness of the bones and rickets. Reference may here be made to oxalic acid, which is present in food as oxalate of lime. It occurs specially in tea, coffee, rhubarb, spinach, and pepper; cereal foods contain little calcium.

Sodium and Potassium.—Salts of sodium are specially required for the fluids of the body, salts of potassium for the

cellular constituents, notably the red blood corpuscles and muscles.

Vegetable foods are, as a rule, rich in potassium salts; animal foods, on the other hand, have a larger proportion of sodium salts. Green vegetables and fruits are the chief sources of these salts, these foods being valuable on account of their containing vegetable acids with which the minerals are combined to form salts known as citrates, tartrates, and acetates, these salts tending to maintain a proper degree of alkalinity of the blood. A deficiency of alkaline salts in foods leads to scurvy. Sodium chloride is the most important salt. It supplies chlorine for the production of the hydrochloric acid of the gastric juice; it stimulates appetite; it promotes renal secretion; and it induces thirst, which is of value in encouraging the drinking of fluid. On an average more than ten grams of salt are taken in the daily dietary, this representing an amount which is far in excess of the body requirements. This excess of salt above the real requirements is more particularly observed in people who live largely on vegetarian foods. There is an ample supply of salt in a mixed diet without adding salt as an extra.

Iron.—Beef, eggs, oatmeal, and lentils have a relatively large amount of iron; milk and its derivatives are poor in iron. A prolonged milk régime leads to anæmia.

Phosphorus.—Meat and vegetables are rich in phosphorus. It occurs usually in organic form, and to a less extent in inorganic form, as phosphates of the alkalis and earths. It is especially valuable for growing children.

V.—Water.

Water is indispensable to life. Seventy-five per cent. of the tissues consists of water. It is required (1) to act as a

medium for taking the food elements to the tissues, and (2) as a solvent for the waste products of the tissues which are excreted in solution by the kidneys (see p. 272).

NUTRITIVE VALUE OF FOODS.

A word may be said as to the methods of determining the nutritive value of foods. This is done :—

1. By a study of its chemical composition.
2. By ascertaining its heat value.
3. By reference to its physiological properties—the ease with which it is digested and absorbed.

Chemical Composition of Food.—Chemical analysis of a food tells us the proportion of protein, fat, carbohydrates, salts, and water present in its composition. The results of chemical analysis, therefore, give us some information as to the value of food, both as a tissue builder and as a source of energy or heat production.

The Heat Value of a Food. *Physical and Physiological Heat Values.*—The heat value of different foods may be determined experimentally by the use of an instrument known as the Bomb calorimeter, a special form of heat chamber, the result being expressed in calories. The standard of heat production is the calorie, which means the amount of heat required to raise the temperature of 1 kilogram of water 1° centigrade. The amount of heat evolved by the combustion in a calorimeter of 1 gram of the different food-stuffs is as follows :—

1 gram protein produces 4 calories.
1 ,, carbohydrate produces 4 calories.
1 ,, fat produces 8.9 calories.

These figures represent the amount of energy set free by

1 gram of the food-stuff combining with oxygen to form the end-products of its combustion. This constitutes the physical heat value of the food—that is, the amount of heat produced by complete combustion of the food in a special calorimeter chamber. The physiological heat value of the food is the amount of heat produced by the complete combustion of the food in the living tissues. Carbohydrates and fats are completely oxidized in the tissues; their physiological and physical heat values are therefore the same. Proteins, on the other hand, are not completely burnt up; urea, the end-product of nitrogenous metabolism in the tissues, being an incompletely oxidized product. The physiological heat value of protein is, therefore, less than the physical heat value by the extent to which urea is capable of further oxidation outside the body.

On referring to p. 23 it will be found that the heat value of an ordinary mixed diet for a man not engaged in severe muscular work is 3,000 calories. This method of gauging the amount of food required is, however, not of very great value in practice. The diet has to be adjusted in each instance from a knowledge of the digestive and absorptive power of the patient, special reference being paid to the influence of the food on fermentative and putrefactive processes in the bowel, under the influence of intestinal bacteria.

DIGESTION AND ABSORPTION OF FOOD.

All foods have to be digested—that is, they have to be subjected to the action of certain juices secreted by the digestive organs. This is done in order to convert the complex food ingredients into simpler substances capable of being absorbed into the blood stream and distributed to the tissues. The process of digestion begins in the mouth and ends at the

lower part of the small intestine. In the mouth the processes to which the food is submitted are partly mechanical and partly chemical. The mechanical part consists in maceration of the food, whereby the harder portions are broken down, so that the whole is reduced to a more or less soft uniform mass. This is effected by mastication, which if thorough is of the greatest value to the whole digestive process, by allowing the digestive juices to become thoroughly mixed with every portion of the food, and thus to act upon it more quickly and thoroughly. The chemical part of the oral digestion consists in the partial digestion of the starches of the food under the influence of a ferment contained in the saliva (ptyalin). This converts starch into dextrines and then into sugar, and the longer the stay in the mouth the more complete the action. Under ordinary circumstances the digestion of starch is not complete in the mouth. Salivary digestion continues for some time after the food has entered the stomach, and is only terminated when the whole contents of the stomach become acid in reaction.

The stomach has a narrow opening through which food enters, and a similar narrow opening (the pylorus) through which it leaves after being digested more or less completely by the gastric juice. The gastric juice contains two chief ingredients, a ferment pepsin and an acid—hydrochloric acid. The ferment can only act in the presence of the free acid. Under the action of the gastric juice the greater part of the proteins of the food is dissolved and converted into more soluble simpler substances, some of which—peptones—are absorbed from the stomach. About half an hour after a meal is taken the pylorus relaxes at intervals to allow the passage of the fluid parts of the gastric contents, which are now spoken of as chyme, and this passage of dissolved and partially digested food from the stomach to the small intes-

tines goes on at intervals for six or eight hours after the ingestion of food. When the food reaches the small intestines it is then acted on by three secretions:—

1. Ferments secreted by the lining membrane of the bowel (the *intestinal juice*).
2. The *pancreatic secretion*, which contains a number of ferments.
3. The *bile*.

Under their influence the whole of the proteins of the food are completely dissolved and converted into simpler bodies capable of being absorbed into the blood stream and distributed to the tissue. Under the influence of the pancreatic ferments the starches are further changed into dextrine, and maltose, and under the further agency of the intestinal juice into dextrose (sugar), in which form the starches are absorbed into the system. Here also the fats are split up under the influence of the pancreatic secretion, aided by the bile, into a form capable of absorption by the vessels. The salts and water of the food are absorbed unchanged.

Throughout the whole of the small intestines active secretion and absorption are taking place, so that the amount of water in the intestinal contents in the lower part of the small intestine is about the same as in the upper part. The contents of the lower part acquire a distinct fæcal odour from putrefactive products produced by the action of bacteria on the proteins of the food. In the large intestine the process of absorption predominates over those of secretion; hence that part of the intestinal contents which has not been absorbed becomes less and less watery, and acquires the character of fæces, in which form it is periodically expelled from the body. The fæces consist mainly of the indigestible

residue of the food, and of substances which have been taken in too large quantities to be digested; they also contain various forms of bacteria.

Time Occupied by Digestion in the Stomach.—An ordinary meal requires from four to six hours' digestion in the stomach, but the time required varies with—

1. The nature and amount of the food.
2. The digestive capacity of the individual.
3. The amount of fluid taken with the meal. An excess of fluid will over-dilute the gastric juice and impede its action.
4. The interval since the previous meal. Some foods are more easily digested than others.

The following table gives the result of some standard observations on the rate of digestion of some common foods:—

1. One to Two Hours.

7 oz. boiled milk.	5 oz. white fish.
7 oz. beef-tea.	7 oz. cauliflower or asparagus.
Whites of 3 eggs.	2½ oz. toast, rusk, biscuits.
7 oz. water, tea, coffee, or cocoa.	

2. Two to Three Hours.

5 raw or poached eggs.	2½ oz. oysters.
3½ oz. raw meat.	5½ oz. bread or biscuits.
9 oz. sweetbread.	5½ oz. rice, spinach, apples, carrots.

3. Three to Four Hours.

8 oz. stewed or roast chicken.	3½ oz. beef steak.

4. Four to Five Hours.

Roast beef, goose, or duck.	Mashed lentils, peas, French beans.

AMOUNT OF FOOD REQUIRED.

The amount of food required varies under different conditions. Thus, the growing child requires relatively more than the adult; old people need less than the middle-aged; and the food requirements of a stout, muscular subject engaged in active physical work are greater than those of a thin weakly subject leading a sedentary life. We will here consider the minimum diet required for a man of average build and weight doing a moderate amount of muscular work—in other words, the standard amount of the different constituents required daily.

A healthy man of average weight, and doing a moderate amount of muscular work, excretes from 16 to 20 grams of nitrogen and about 320 grams of carbon daily. The investigations of Atwater, Rubner, Voit, and others, until lately regarded as classical, established the standard amounts of the nutritive constituents required to make this loss daily, as follows:—

Protein	125 grams, or	$4\frac{1}{2}$ ounces.
Carbohydrate	500 ,,	18 ,,
Fat	50 ,,	$1\frac{4}{5}$,,

These yield the following amount of heat in calories:—

Protein	125×4.1	512.5 calories.
Carbohydrate	500×4.1	2050.0 ,,
Fat	50×9.3	465 ,,
		3027.5 ,,

No single article of food contains these elements in a proper proportion, and for this reason a mixed diet is necessary, as by that means only can we avoid taking too largely of one or other ingredient.

Expressed in terms of ordinary foods, the above dietary is approximately as follows:—

		CARBON. Grams.	NITROGEN. Grams.
1 lb. bread,	containing	117	5.5
½ lb. meat,	,, ...	34	7.5
¼ lb. fat,	,, ...	84	—
1 lb. potatoes,	,, ...	45	1.3
½ pint milk,	,, ...	20	1.7
¼ lb. eggs (2 eggs),	,, ...	15	2.0
⅛ lb. cheese,	,, ...	20	3.1
		335	21.1

Or, if expressed in meals:—

Breakfast—

2 slices of thick bread and butter.

2 eggs.

Dinner—

1 plateful of potato soup.

Large helping of meat with fat (about 6 oz. of cooked meat).

4 moderate-sized potatoes (¾ lb.).

1 thick slice of bread and butter.

Tea—

Glass of milk and 2 thick slices of bread and butter.

Supper—

2 thick slices of bread and butter and 2 oz. of cheese.

In the case of subjects engaged in severe muscular work, it has long been taught that the amount of food required is greater than the above, the increase being shared by all three food constituents so as to furnish an energy value of 4,500 to 5,000 calories.

In recent years the researches of Chittenden *on protein requirements* have thrown considerable doubt on the correctness of these views. Chittenden's observations were made on three classes of subjects—

1. Men engaged in mental work;
2. Soldiers engaged in moderate exercises; and
3. Highly skilled athletes—

his experiments being conducted with great care and over long periods. Chittenden's work has rightly attracted a very large amount of attention because of the very large number of persons simultaneously experimented upon, and the completeness of the experiment from the point of view of chemical analysis. Chittenden found that a state of good bodily health was maintained on a diet which contained from one-half to one-third of the protein in the standard diet.

It will be seen that Chittenden's results throw much doubt on the correctness of the teaching as to protein requirements, hitherto regarded as well established. There is no question that the ideal diet consists in the smallest amount of protein food, together with non-nitrogenous food, that will keep the body in a state of vigour. The question is whether it is right to accept as correct, for protein consumption—

1. The minimum of 100 to 120 grams of the commonly accepted standard dietary; or
2. The minimum of 50 to 70 grams of the Chittenden standard.

Chittenden's explanation of the advantages of a low protein is, that the protein food when metabolized yields a number of crystalline nitrogenous products which are excreted through the kidneys. If proteins are taken in excess the kidneys are overworked, and the end-products of protein metabolism either surcharge the blood or are deposited in the tissues, giving rise to various diseased states. There is, in the author's opinion, no doubt whatever as to the correctness of Chittenden's main contention that the amount of protein required daily to maintain the body in a satisfactory state of health is less than the amount hitherto regarded as essential; and secondly, that some at least of the excess is injurious to health. This view is now very largely held by medical men.

THE INFLUENCE OF VARIOUS CONDITIONS UPON THE AMOUNT OF FOOD REQUIRED.

Influence of Age and Sex.—The age of the individual not only modifies the absolute amount of food required, but also the relative quantity in proportion to body weight. The rapid growth of children in early life necessitates a relatively larger consumption of food than at any other period of life; more especially it calls for a large supply of building material—that is, proteins. Fats are also of particular value in the growing period.

The standard of increase usually adopted may be roughly indicated as follows :—

A child under 2	requires	0.3	the food of a	man doing	moderate work.
A child of 3 to 5	,,	0.4	,,	,,	,,
A child of 6 to 9	,,	0.5	,,	,,	,,
A child of 10 to 13	,,	0.6	,,	,,	,,
A girl of 14 to 16	,,	0.7	,,	,,	,,
A boy of 14 to 16	,,	0.8	,,	,,	,,

In old age the processes of assimilation are less active, and the bodily activities are restricted; hence less food is required. Over-feeding is a fruitful cause of serious trouble in elderly subjects. (See p. 268.)

Under similar conditions women require less food than men, for the reason that they are usually smaller and do less muscular work. Given precisely similar conditions as to the weight of subject and amount of physical work performed, there is probably no difference in the amount of food required. The diet in pregnancy should be liberal, but not excessive. During lactation the amount of food must be increased, more especially in protein and fat, in order to make good the nutritive elements lost in the milk.

Rest and Exercise.—Much less food is required during rest than during exercise. The following is the generally accepted statement of the number of calories which must be supplied for the work of different degrees of severity (Rubner):—

	Calories.
Rest—for example, a clerk at a desk	2500
Moderate muscular work—for example, house-painter...	3121
Severe muscular work—for example, shoemaker	3659
Hard labour—for example, blacksmith	5213

The researches of Chittenden, however, already alluded to, throw great doubt on the correctness of this teaching.

In the present state of our knowledge it is not possible to be too dogmatic on the subject. It is probable that an increase of food by one-fourth or one-third of the normal is all that is necessary for subjects engaged in severe muscular work.

The question arises as to whether the increase of food undoubtedly necessary for subjects engaged in hard physical work should come mainly from the proteins, fats, or carbohydrates. There are no data by which this can be precisely determined. By those engaged in training for athletics, proteins are largely relied on to supply the extra energy; but for ordinary purposes it is certainly advisable that the increase should be equally distributed among the proteins, fats, and carbohydrates of a mixed dietary, sugar being specially advantageous.

Climate and Seasons.—Climate and temperature influence the quantity and quality of food required. In tropical countries the natives live largely on vegetable foods and fruits, and consume less animal food and fat. The explanation of this is to some extent to be found in the fact that the natives of any country eat what they can most easily obtain. At the same time we must recognize the necessity for supply-

ing the body with a large proportion of combustible food, such as carbohydrates and fats, when the external temperature is very low. It is also clear that less food of this kind is required when the external temperature is high. In this country common experience has shown the advisability of modifying the diet in the heat of summer, less animal food being taken, vegetable substances and fruits entering then more largely into the dietary.

Personal Idiosyncrasy.—It is a matter of common observation that some people habitually eat much less than others, although living under the same general conditions. This is, in all probability, to some extent a result of habit and general training. At the same time there is no doubt that some tissues work more economically than others, with corresponding advantage to the individual. Many special idiosyncrasies with regard to diet have to be considered. Some persons cannot take eggs in any form; others cannot take milk; some are made ill by certain kinds of fruit or meat. These may be the result of inherited tendencies, or may be the growth of habit.

INFLUENCE OF VARIOUS FACTORS ON DIGESTION.

Appetite, Hunger, and Thirst.—Appetite means the enjoyment of food and drink; hunger and thirst mean a longing for food and drink. The stimulus created by food is more or less specific. By that we mean that each kind of food calls forth a supply of the special juices that are particularly required for its digestion. This no doubt explains how it is that sudden changes of diet are not well tolerated.

Reference must be made to the various conditions which interfere with normal digestion. One of the commonest is *unduly hurried meals.* The bolting of imperfectly masticated

food is a fruitful cause of indigestion. *Irregularity in meals* is another factor which may derange digestion. This irregularity may take the form of unequal and irregular hours between meals, as, for instance, allowing six hours to elapse between the first and the second meal of the day, and three hours between the second and last; or it may take the form of want of regularity in the size and nature of the meals, as the partaking of a heavy midday meal by a person who has accustomed himself to a light luncheon in the middle of the day. *Constipation* interferes with healthy digestion, more especially if it be associated with auto-intoxication (self-poisoning), such as frequently arises from altered bacterial activity in the digestive tract, the result of a septic condition of the teeth (*oral sepsis*). *Lack of appetite* may lead to a weakening of the digestive powers, but in this connection we have to note that in some people the introduction of food into the stomach seems to induce an appetite. A *sudden change in diet* may adversely affect digestion. The researches of Pawlow have shown that the digestive juices adapt themselves in a remarkable manner to the kind of food—a protein diet leading to the development of juices specially adapted for the digestion of proteins, a carbohydrate diet similarly inducing secretions specially adapted to digest carbohydrates. It is, therefore, easy to understand that any sudden and complete change of diet may for the time being interfere with normal digestion. The digestive powers may also be modified by *the nature of the food.* For example, an over-fatty diet interferes with the action of the gastric juice; excess of fluid may lead to an impairment of its action through over-dilution; or new bread, new potatoes, and the like may throw a strain on the gastric secretion which it is unable adequately to deal with. The *temperature of the food* is of some importance, hot food stimulating the flow of the

salivary and gastric secretions, iced foods sometimes arresting the digestive process, especially when taken immediately after hot foods. Lastly, *active, physical, or mental work* should be avoided during the earlier stages of digestion, as the blood is then primarily required for the digestive processes.

Sleep in Relation to Meals.—Sleep is affected by the quantity and kind of food taken. A heavy meal taken shortly before going to bed may be followed by a disturbed and restless night and by sleep of an unrefreshing character. As it ordinarily takes three hours to complete gastric digestion, that time at least should elapse between the last regular meal of the day and bedtime. Many patients find that their sleep is disturbed after taking certain articles of food or drink in the afternoon or evening—for example, strong tea or coffee, new scones, and the like. On the other hand, sleeplessness is often observed in elderly subjects who have taken only a light evening meal, and may be promoted by taking a little fluid food at bedtime—for example, a cup of hot beef-tea, malted milk, or thin gruel.

II.

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Chapter II.

ANIMAL FOODS.

MILK AND ITS PRODUCTS—EGGS—MEATS, ETC.—FISH.

MILK.

MILK is the type of a complete food provided by Nature. In early life it forms the exclusive food of all young mammals.

It is in the highest degree important for the well-being of young children to have milk which is of excellent quality at its source, and it is equally necessary that it should not be adulterated or infected in the process of transit and distribution. Since the sources of contamination are numerous, the task of obtaining an absolutely pure supply is a difficult one, and in recent years the question of the milk-supply of our large towns has engaged more and more the attention of the medical profession and of civic authorities.

Chemical Composition.—The milk of all animals contains the elementary substances—proteins, fats, carbohydrates, salts, and water—combined in such proportions as are best adapted for the period during which growth is most active.

Milk is an emulsion consisting of fine oil globules suspended in a colourless liquid or plasma.

When freshly drawn, the reaction of milk varies in different animals. Human milk is alkaline; cow's milk is neutral;

the milk of carnivora is acid in reaction. On standing, all milk becomes acid, owing to the formation of lactic acid, through the action of bacteria normally present in milk. The average proportions of the chief ingredients in cow's milk and human milk are here given for comparison :—

	Cow's Milk.		Human Milk.	
Proteins—Casein	3.25	4.0	.6	2.0
,, Lactalbumin	.75		1.4	
Fat		3.5		3.5
Sugar		4.0		7.0
Salts		.7		0.2
Water		87.8		87.3

It will be seen that the chief differences in composition are the much larger amount of protein and the smaller proportion of sugar present in cow's milk. There is further an important difference in the nature of the proteins, for while in cow's milk they consist chiefly of casein, the proportion of casein to lactalbumin being 4.1, in human milk lactalbumin is the chief protein, the proportion of casein to lactalbumin being approximately 1.2. The practical importance of this is readily appreciated if samples of the two milks are treated by the addition of weak hydrochloric acid. Large masses of curd are at once formed in the cow's milk, while the human milk shows a fine flocculent precipitate. Similar changes occur in the stomach. Another important difference is the sterility of human milk in contrast with the large number of bacteria normally present in cow's milk as it reaches the consumer. We will now consider cow's milk and its derivatives.

Cow's Milk.

The composition of milk varies within wide limits, so that it is impossible to gauge within 20 per cent. the amount of

nutritive materials contained in a given quantity. The main variations are in the amount of fat and protein present. The composition, quality, and quantity of milk are influenced by a variety of circumstances, such as the breed of the cow, the nature and quality of the food supplied to the cows, and the degree to which the milk has been adulterated by the addition of water, sugar, or other preservatives, such as formalin, etc. (See p. 168.)

The *specific gravity* of milk is from 1,026 to 1,035. This is, however, of no value as a test of its quality, because skimming milk raises the specific gravity, since fat is lighter than water. Hence, milk can be skimmed and water added to keep the specific gravity the same. An estimation of the fat is essential for determining the nutritive value of milk. *Good milk should contain* 4 *per cent. of fat.*

The *proteins of milk* consist of casein and a small amount of lactalbumin. *Casein* is the principal protein, and is kept in a state of solution by the phosphate of lime present in milk. This substance can be extracted and dried, and is the basis of many useful preparatory foods (see p. 50). These preparations of casein are used to increase the nutritive value of gruels, soups, teas, and puddings. *Lactalbumin* is present only in very small quantity in milk; it coagulates slowly when boiled, and forms the "skin" on boiled milk.

The *carbohydrate of milk* is in the form of *lactose* or *milk sugar.* This is less soluble than ordinary sugar, from which it also differs in having no sweet taste. It is readily split up by certain micro-organisms, with the production of lactic acid, a process which occurs in the souring of milk. Many cases of diarrhœa in infancy are due to the irritation of lactic acid produced in this manner.

The *fat of milk* (*cream*) is in the form of an exceedingly fine emulsion, being suspended in the plasma of milk in the

form of globules, which impart to milk its white, opaque appearance. The proportion of fat should not be less than 3.5 per cent. When the cream is removed, skimmed milk is left; this, however, may still contain from ½ to 1 per cent. of fat. If the cream be removed by a separator, the fat is much more completely abstracted, and the milk so prepared is known as separated milk.

The *mineral matters* are of great importance, the most important salts being the *phosphate of lime* and *phosphate of potassium*. The one important mineral constituent that milk lacks is iron, and this has to be borne in mind when giving a prolonged course of strict milk diet. *Citric acid* is present in milk, chiefly combined with lime as calcium citrate. It has been suggested that this is the antiscorbutic element of milk.

The remaining ingredient is water. This keeps the solid constituents in solution, but makes milk a dilute and bulky food.

Clotting of Milk, and its Effect on the Digestibility.— Milk is not truly a fluid food, for whenever milk enters the stomach the ferment rennin and the acid of the gastric juice change the milk into a solid curd. This coagulation or clotting of milk must be distinguished from the curdling of milk. *Curdling* is due to the casein separating out of the milk in the form of a fine precipitate of unaltered casein, this taking place under the influence of lactic acid fermentation, which removes the casein from its combination with lime salts. In the process of clotting, on the other hand, the casein is profoundly changed, and acquires new and distinctive characters. The clot consists of the solidified casein with fat entangled in its meshes. The clot gradually shrinks and becomes more tough and less easily digested. Under normal conditions this clot redissolves in the alimentary tract; but

in pathological conditions, such as enfeebled states of the digestive ferments, a hard, firm, indigestible mass forms in the stomach, which may prove an irritant to the whole intestinal tract, inducing pain, flatulence, diarrhœa, or constipation, and may be recognized unchanged in the fæces.

Various methods are adopted to control the density of the curd, and so improve the digestibility of milk.

1. By *reducing the proportion of casein;* this is done by diluting the milk. The diluent may be simply plain water; a mixture of half and half will materially lessen the clotting. The addition of an aerated mineral water acts in two ways: firstly, by dilution; and secondly, the aeration makes the clot more friable; potash, seltzer, soda, or salutaris may be used. The admixture of barley-water, toast, rice, or oatmeal water is also useful (see ch. xxii.); the thickened fluid hinders the formation of large curds and makes the clot more friable. Gelatine jelly (ch. xxii.), used in the proportion of 1 teaspoonful to 2 ounces milk and 2 ounces of water, is also useful.

2. By *reducing the toughness of the clot*, the addition of *lime-water* in the proportion of one in three acts on the milk in several ways. It dilutes it; the addition of lime renders some of the soluble lime salts insoluble, and so neutralizes the acidity of the milk; this effects the desired result of lessening the toughness of the clot. Lime-water causes constipation, and if the patient is suffering from diarrhœa, this may be an advantage, but in other cases it is prejudicial. The addition of *sodium citrate* produces a smaller and softer curd. One grain of citrate of soda added to one ounce of pure milk serves partially to prevent the clotting, while two grains added prevents it entirely. This is specially useful in infant feeding. *Sodium bicarbonate* in solution (4 drams to 1 ounce) can be used in the same proportion as lime-water (1 in 3), and does not produce constipation.

Nutritive Value.—With regard to its nutritive value as a food for adults, milk cannot be recommended as the sole article of food, for the following reasons: In order to get sufficient carbohydrates, a very large quantity of milk is required (8 pints). This means that the body is supplied with more fat, protein, and fluid than is necessary, or than can readily be digested. Further, although milk is bulky it does not supply sufficient residue to set up peristalsis, and it is therefore constipating. If combined with a carbohydrate, that element in which it is defective, milk is an excellent food, and if taken with bread, a smaller quantity of milk would suffice. In states of illness or during convalescence these objections to a milk dietary largely disappear, and milk at once takes its place as the most useful food.

The chief clinical use of milk may be summarized as follows :—

1. In fever, milk acts as a quencher of thirst as well as a food.
2. Milk, from the large amount of fluid present, acts as a diuretic; it is the main article of food in inflammatory conditions of the kidney.
3. In patients requiring extra nourishment, milk may be taken with meals in the place of other non-nutritive fluids.
4. The digestibility of milk is increased by the addition of substances which tend to make a finer clot, such as barley-water; also the administration of some solid food, such as bread.
5. Milk is of special value in cases of "acidity" of the stomach and other gastric disorders. Skimmed milk is here of very special value.

6. Owing to the lack of residue from this food, milk is of great value in states of catarrh and ulceration of the gastro-intestinal tract.
7. In patients at rest in bed the bulkiness of milk is no drawback, as not more than three or four pints are required.

To vary the monotony of a milk flavour, some recipes are given on pp. 397–399.

Milk is frequently *adulterated* or *contaminated.* An account of the more common adulterations is given on p. 168. Milk may be contaminated by the *cow's disease germs*—for example, tuberculosis and diphtheria. *Extraneous disease germs* may find their way into milk through contact with unclean hands, or from polluted water used for dilution or for washing cans and pans. Examples of diseases so induced are typhoid fever, scarlet fever, gastro-enteritis, diarrhœa, etc. The milk is often tainted with excrementitious matter from the cowshed.

Professor Silvanus Thompson describes the ideal system of cleanliness which provides a "guaranteed milk":—

"Each milkman, before milking, is required to cleanse his hands in hot water with soap and a nail-brush; he then dons a clean white linen suit from the sterilizing chamber, and takes a clean towel and milking stool; he is not allowed to moisten his hands with the milk in milking, and he must wash his hands each time before milking another cow. All cows must have given a negative tuberculin test, and all are groomed twice a day before milking. The milk is drawn into pails with small openings, which exclude droppings from the animal's belly. The milk is strained through sterilized absorbent cotton, and placed in a cooler, which reduces the temperature to 40° F. within twenty minutes after leaving the

udder. It is then bottled and stored in ice water ready for shipment."

Good, clean, uncontaminated milk should keep fresh, exposed in a clean room at ordinary temperature of 68° F., for forty-eight hours, without *souring and coagulating.* But if the air is warmer, or if the milk be in any way contaminated, it will sour in a few hours. Boiled milk will keep fresh about half as long again as fresh milk. A large number of bacteria are capable of inducing lactic acid fermentation of the milk sugar, and some of them carry the decomposition further, to the development of carbonic acid and alcohol. This latter interferes with the normal digestion of milk. Lastly, it is important to bear in mind the absorbent power of milk: it may acquire a flavour or odour from substances in its vicinity. It should not, therefore, be kept in a pantry beside such food-stuffs as stale cheese or onions, and it should not be left exposed in a sick-room or anywhere near a waste-pipe. The effects of heat on milk (Pasteurization, sterilization, etc.) are described on chapter on "Infant Feeding," p. 190.

Cream.—Cream consists mainly of fat ~~milk~~. It, however, also contains protein and sugar in the same proportion as milk. The real difference between cream and milk is that cream contains less water.

The percentage of fat in cream may be from 10 to 20 per cent., as in cream obtained by skimming milk; cream produced by centrifuge may contain from 40 to 60 per cent.; and the clotted Devonshire cream may contain as much as 70 per cent. or more. A legal standard for cream would be advantageous.

Varieties of Cream.—*Tea cream*, as sold in the dairy, is generally a thin cream produced by skimming milk in the ordinary way.

Double cream, or *separator cream*, is obtained from the milk by centrifugal force. A small and large drum are placed one within the other, leaving a space of a few inches between. The inner drum is made of porous material. It is filled with milk and set in rapid revolution. The lighter portion, the cream, remains in the inner drum, while the other ingredients are forced through it into the outer drum.

This method of obtaining cream is far more rapid than when it is allowed to rise by standing, and also it obtains *almost all* the fat from the milk. Cream procured in this manner does not remain fresh so long as ordinary cream, for it is separated at a temperature favourable to the growth of bacteria.

Condensed or *evaporated cream* consists of one-fourth cream and three-fourths other ingredients of milk, the whole milk having been evaporated. It is, therefore, a natural product, and is not artificially sweetened.

Clotted or *Devonshire cream* is a special variety prepared by heating the milk in deep pans over a slow fire not above 150° F. This causes a rapid and complete separation of fat. The proportion of fat in such cream is from 60 to 70 per cent. Devonshire cream contains only about half as much sugar as ordinary cream, and it is peculiarly suited to be a source of fat in the dietary of diabetics.

Cream is one of the most wholesome and agreeable forms of fat. It is often eaten too rich, and may disagree on that account, but if diluted with an equal amount of water or lime-water it can be easily digested.

Where there is difficulty in digesting milk, three or four tablespoonfuls of cream in a tumblerful of Vichy makes a nourishing and digestible beverage. The nutritive value may be increased, if desired, by the addition of half an ounce of sugar of milk. It may be used along with or to replace cod-liver oil in pulmonary tuberculosis, and it is an admi-

rable food in any case of long-continued suppurative disease —for example, hip joint disease or empyema. It must be avoided in cases of flatulent indigestion, in most forms of gastric disorder, in obesity, and in gall-stones.

The addition of strong liquors to cream lessens its digestibility—the alcohol coagulates and toughens the envelopes of the fat globules.

Ice cream is a frozen mixture of cream, sugar, and flavouring agent. When very simply made it is nutritious, and may be allowed to many patients. It is soothing to inflamed throats, and is enjoyed by convalescents from fevers. The nutritional value of ice cream can be increased by the addition of egg or plasmon.

Whey.—When milk has been standing for some time, a spontaneous coagulation occurs, and whey is squeezed out of the contracting clot. Whey so prepared has a sourish taste, and is less palatable than the artificially prepared varieties. Whey is also artificially prepared by the addition of rennet, lemon juice, or wine, in the manner described on p. 197; also ch. xxii. It is practically an aqueous solution of milk-sugar. It can be added to beef-tea, or beaten up with yolk of egg in hot water.

Whey makes a palatable drink, with slightly diuretic and laxative properties. Whey cures, where up to five pints of whey are taken in twenty-four hours, have been established for the treatment of renal and dropsical affections.

Butter.—Butter is made from the cream of milk by churning. It consists of about 80 per cent. of fat, 15 per cent. of water, with a little casein and sugar. A certain amount of common salt is added to increase its keeping qualities and to improve its taste. Pure cultures of certain organisms are made use of to ripen butter, and so impart a constant flavour. Butter is easily digested and absorbed. Most persons eat about an ounce a day of butter, but two or

three times that amount may be taken by some people. The adulterations of butter are given on p. 169.

Margarine and Butterine.—These are purified animal fats made up so as to closely resemble butter. They are made by melting down and clarifying various animal fats. The melted fat is allowed slowly to cool, and in the process the various fats solidify at different temperatures. After the stearin and palmitin have solidified, the olein is removed by pressure, churned up with a little milk, and tinted with a vegetable dye, and is then ready for use. They are admirable substitutes for butter, and they could with advantage be made more use of, especially in cooking. The legal control of their sale is mainly intended to prevent them from being fraudulently offered as butter. A useful and cheaper variety of margarine is made from the oil of nuts.

Cheese is another milk derivative, consisting of casein of the milk, separated by rennet, with some of the fats or oils. Cheese, as a food-stuff, presents a large amount of nutriment in small bulk, one pound of cheese containing as much nitrogenous food as two pounds of meat. In countries where meat is scarce and dear, the country people consume large quantities of the heavier, less highly flavoured cheeses. The wealthy classes eat cheese more as an extra taken after meals, and employ the higher flavoured varieties.

The *varieties of cheese* depend upon—

1. The quantity of water they contain; this chiefly determines the hardness or softness.
2. The quantity of fat present, this being small in amount in cheese made from skimmed milk, and large in amount in cheese made from milk fortified with cream.
3. The kind and degree of the fermentation processes, upon which the flavour largely depends.

The *nutritive value* of cheese depends largely on the proportion of fat present in its composition. There are three leading varieties—soft, hard, and skimmed milk. A fair average for the fat and nitrogen present in these three types, *when fresh*, is as follows (Fleischman):—

	Soft.	Hard.	Skimmed Milk.
Fat	31 to 44	29	2 to 3
Nitrogen	13 to 24	28	19 to 33

Such cheeses as Stilton, Gloucester, Gorgonzola, Edam, Cheshire, Roquefort, and Imperial, are examples of rich cheese made from milk fortified with cream; while skimmed milk is chiefly used in the manufacture of Single Gloucester, American, Dutch, Suffolk, and Parmesan. The fat present in the "rich cheeses" makes the cheese soft and friable, and they decompose more rapidly. This process is called "ripening."

Cheese cannot be regarded as an article of diet suitable for patients with a weak digestion. This is specially true of the richer cheeses, in which the large amount of fat interferes with the ready digestion of the casein. It is advisable for those with weak digestions, who are very fond of cheese, to partake of one of the softer varieties, as, although less digestible, they are much less likely to be taken to excess. The addition of an alkali (for example, bicarbonate of potash) makes it more easily digested, the alkali forming a soluble compound with the casein. This is best done by adding a pinch of the salt to ¼ lb. of grated cheese, which may then be mixed with another food-stuff, such as milk or eggs. The large number of bacteria in ripe cheese is another factor which makes cheese an unsuitable article of diet for invalids. The recently introduced lactic St. Ivel cheese is a very palatable cheese, rich in lacto-bacilli. It has undoubted advantages over other cheeses for patients not endowed with a robust

digestion. Some good recipes for cheese dishes are given on pp. 402, 403.

Buttermilk.—Buttermilk is the milk left after churning and removing the fat. Its sourness is due to the presence of lactic acid, derived from the conversion of sugar. The casein is present in a flocculent form, and on this account buttermilk is a readily digested food. It is a cheap food, since it is a good source of protein. A pint of it contains as much nourishment as two ounces of bread. It is a wholesome drink, with diuretic and special medicinal properties. Further reference to buttermilk and soured milk is given on p. 288.

Koumiss.—Koumiss is a fermented milk, prepared by both lactic acid and alcholic fermentation. It is made from the milk of a certain breed of mares in South-eastern Russia; it is also made from cow's milk, to which an artificial ferment has been added. The milk is mixed with a koumiss ferment, the lactic acid ferment changing some of the sugar into lactic acid, while another part of the sugar is converted into alcohol and carbonic acid. Koumiss is an acid effervescing drink, with an agreeable bitter taste, and contains from one to two per cent. of alcohol. The strength of koumiss varies with the duration of fermentation. It is very sensitive to temperature changes, and its composition is always changing, unless the fermentation is controlled by extreme cold. It is very easily digested, being much more digestible than milk.

Kephir.—Kephir is another form of fermented milk resembling koumiss. It is made from cow's milk, alcohol, lactic acid, and albumin being formed as a result of the fermentative process. The casein is partly digested. Tablets of the kephir ferment are sold for the home manufacture of the milk; it may also be made as follows:—

Boil fresh milk, and when nearly cold put into quart bottles, leaving room to shake. Add half an ounce of crushed lump sugar and a piece

of Vienna yeast the size of a hazel nut (that is, 20 grams), cork with new corks, tie down, keep cool; lay the bottles horizontal, but shake twice daily. It will be ready to drink about the sixth day, or earlier in hot weather and later in cold weather. It can be made with skimmed milk.

Foods Prepared from Cow's Milk.

Condensed Milk.—Condensed milks are all made from cow's milk, either whole or skimmed. It is prepared by slowly evaporating the water off the milk to the consistence of honey. As a rule, the milk is only reduced to one-third of its original volume. Most brands of condensed milk have cane sugar added to help it in its preservation. We have thus three types of condensed milk, as follows:—

1. *Whole Milks, Condensed and Unsweetened.*—The following are the chief brands: Ideal, First Swiss, Peacock, Viking, Hollandia. Their composition is as follows:—

	Water.	Protein.	Fat.	Lactose.
Ideal	62.00	8.3	12.4	16.00
First Swiss	62.15	9.9	11.33	14.44
Peacock	64.05	—	10.04	1.28
Viking	——	8.9	9.9	——
Hollandia	57.00	11.3	9.8	3.4

These are prepared by evaporation by heat sufficiently strong to render the milk sterile, or nearly so, so that no preservative materials are added. The milk is open to the same objections as the use of sterilized milk, but is better for infants than those forms of condensed milk in which preservation is secured by the addition of too large a proportion of cane sugar. A dilution of two parts of water makes the mixture approximate more or less closely to cow's

milk. Further dilution and the addition of cream and sugar are necessary to make the fluid at all similar in composition to human milk.

The unsweetened milks tend to go bad quickly when opened. For this reason they should be kept in a cool place after being opened, and the smallest size of tin should be purchased.

2. *Whole Milks, Condensed and Sweetened.*—These are made from whole milk, with the addition of cane sugar to such an extent that the cane sugar added is greater than the solids of the milk, and its function is to act as a preservative. The following is the composition of some of the best-known brands :—

	Solids.	Protein.	Fat.	Milk Sugar.	Cane Sugar.
Nestlé	77.2	9.7	13.7	15.0	37.2
Rose	76.6	8.3	12.4	17.6	36.1
Milkmaid	76.3	9.7	11.0	14.6	38.7
Full weight	76.5	12.3	11.0	13.5	37.2
Anglo-Swiss	74.4	8.8	10.8	16.0	37.1

On account of the large amount of sugar present in these preparations, in order to make the milk palatable, a degree of dilution is required which makes it impossible for the resulting mixture to be at all like cow's milk in its proportion of protein and fat.

Humanized condensed milk is prepared by the addition of cream and lactose, before condensation, in such quantities as to form a solution when suitably diluted equivalent to human milk in percentage composition.

3. *Sweetened and Condensed Skimmed Milk.*—Under the Sale of Food and Drugs Act, 1899, there is a section which prohibits the importation or sale of condensed,

separated, or skimmed milk except in tins or other receptacles which bear a label, wherein the words "machine skimmed milk" or "skimmed milk," as the case may require, are printed in large and legible type. Recent investigations made by the Local Government Board have shown that there is evidence from nearly all parts that this preparation is largely used, and that in some districts its employment is probably extending. If we ask how it is that mothers feed their babies from tins bearing the words "machine skimmed milk" plainly printed on the labels, the cause in all probability is poverty and ignorance. There are many mothers who would not think of using ordinary fresh skimmed milk for their babies, but the presence of sugar in, and the viscosity of, the condensed variety gives a fallacious appearance of richness, and renders the food more satisfying to the baby. The chief characteristic of the condensed separated milks is its poverty in fat—as a rule, not exceeding 1.5 per cent. When suitably diluted, these milks are very deficient both in protein and fat, and are thus not foods adapted for infant feeding. Such brands may be useful as food for culinary purposes and for addition to tea, but should certainly never be given to infants.

Advantages and Disadvantages of Condensed Milks.

Condensed milks are more easily digested than cow's milk. For this reason, condensed milk is occasionally of much value in the treatment of infants who are unable to digest ordinary milk. The great popularity of condensed milk is chiefly due to the ease with which the infant's meal is prepared. The disadvantages are marked. They contain, as a rule, too little fat. The unsweetened milks are alone satisfactory in this respect. In suitable cases this can be

remedied by the addition of cod-liver oil to the diet. In the dilution recommended they are usually deficient in protein—this holds good very specially in the skimmed milk preparation. This deficiency may be remedied by the administration of protein in other forms—for example, egg albumin. Further, they are not fresh foods. They all lack the important "antiscorbutic" element present in fresh milk. This can to some extent be counteracted by adding to the dietary a little fruit juice every second day. The nutritive value of any preparation depends on the quality of the milk, the degree of condensation, the addition of cream (if any), and the amount of cane sugar added. It need hardly be added that only the best brands should be used. It should also be noted that condensed milks are expensive in comparison with ordinary milk. As a rough computation, it may be said that the price of the milk diluted and ready for use works out at 4d. per pint.

Dried Milk Preparations.—There are a large number of preparations of dried milk in the market; they belong to various groups :—

1. *Milk powders*, composed of milk modified by the abstraction of casein or addition of sugar, or both. Allenbury No. 1 food is a food of this sort: it is made from cow's milk from which the excess of casein has been removed and the deficiency of sugar and fat corrected. It is free from starch, and is often very useful during the first three months of infant life, when a temporary change from fresh cow's milk mixture is indicated.

2. *Dried milk*, made from whole or skimmed milks. Whole milk dried is sold as glaxo (Nalhan and Co.), and lacvitan (Prideaux), at 1s. to 1s. 3d. per pound. Albulactin is a guaranteed pure soluble milk albumin, which does not contain casein; it is an admirable preparation. Dried skimmed milk is sold as lacumen, at 5d. to 9d. per pound.

3. *Casein Preparations.*—There are a large number of these preparations. The nutritive value is high, containing as a rule over 90 per cent. of pure protein. Their great value consists in that they can be added to other foods, thus "fortifying" them with the nitrogenous element. The preparations are tasteless, compact, easily digested, and soluble. Their solubility enables them to be added to other food—such as soups, jellies, milk puddings—greatly raising the nutritive value of the diet.

Dried casein is a product of the Protene Company, and forms the basis of many of the patented preparations. It is in the market as protene flour. Casein is purin-free (p. 295), does not clot, and is easily digested and absorbed. Casein combined with ammonia is sold as eucasin, and with sodium as nutrose. Sanose is a mixture of casein (80 per cent.) and egg albumin (20 per cent.). Sanatogen is a valuable casein preparation, with 5 per cent. sodium glycero-phosphate added.

Plasmon is a tasteless, odourless, white powder, entirely soluble in water. It is casein of milk made into a readily soluble powder by the addition of an alkali, and it contains phosphorus in organic form. It is one of the cheapest and best of the dried milk preparations.

One teaspoonful of plasmon is equivalent to the protein value of about 2 pints of milk. Plasmon is best added to soups, milk gravy, etc., after it has been dissolved.

$$\left.\begin{array}{l}\text{Plasmon, 3 teaspoonfuls.}\\ \text{Water (tepid) } \tfrac{1}{2} \text{ pint.}\end{array}\right\}\ \text{Prepared plasmon.}$$

Add 3 teaspoonfuls of tepid water to the plasmon, stir and rub into a paste, then gradually add the tepid water, place on the fire, bring to the boil, stirring well all the time, and boil for two minutes. This can now be added to milk

or other liquid beverage. When cold, the prepared plasmon will form into a jelly, which when whisked will turn into a thick cream. The jelly or cream can be added to all food—liquid or solid. Plasmon may be added to milk, butter, porridge, and puddings, recipes for which are given on pp. 408, 410, 426. It can also be bought combined with cocoa, arrowroot, tea, biscuits, chocolate, oats, and blancmange custard. Certain infant foods—for example, Allenbury Nos. 1 and 2, and Horlick's malted milk—are also dried milk preparations.

Casumen (Prideaux) is a white, flake-like powder, odourless, tasteless and soluble, and miscible with ordinary food and drink. It is free from starch and sugar, and keeps indefinitely. It is combined with other foods in much the same way as plasmon is. A diabetic milk can be made from it by the addition of water, a pinch of baking soda, and saccharin.

Protein and *tilia* are also similar preparations.

EGGS.

Eggs contain all the ingredients necessary to support life and develop the organism.

From their chemical composition it is readily understood how they are such valuable articles of food in the dietetic treatment of disease, especially in some ailments occurring in childhood and youth.

Comparing the composition of the edible part of the whole egg with that of moderately lean meat, we find as follows :—

	Egg.	Lean Meat.
Water	73.7	73.0
Protein	14.8	21.0
Fat	10.5	5.5
Ash	1.0	1.0

The nutritive matter is thus seen to be almost the same as meat, eggs being poorer in protein but much richer in fat.

The *white of egg* contains its protein in a solution enclosed in numberless little cells. When white of egg is beaten up, the walls of the cells are ruptured and the protein is set free. The result of beating is to increase the digestibility of egg-white, the protein being more easily broken up when released from the cell.

The *yolk of the egg* is much the more nourishing portion. It contains a greater proportion of fat, and in its ash there are some very important mineral constituents, such as phosphoric acid, lime, and iron. The phosphorus and iron are almost entirely present as organic compounds. As mineral matters are most easily absorbed when combined with an organic substance, it follows that yolk of egg is a useful adjunct in the treatment of several forms of nutritional and blood diseases. In chlorosis and some other forms of anæmia, and also in rickets, the great richness of the yolk in lime, phosphorus, and iron makes it most valuable.

The fats present are the same as those present in butter. They appear in emulsion form, and are thus very easily digested. Eggs, from their chemical composition, should be used with a carbohydrate diet. The usual custom of preparing rice and starchy preparations—such as arrowroot, tapioca, cornflour—with eggs in the making of milk puddings is a perfectly right one, the result being a perfect food. The nutrient value of an egg corresponds approximately to a full half-tumblerful of milk, or to 1½ ounces of fairly fat meat.

The *digestibility of eggs* varies, depending on the form in which they are taken. A raw egg takes longer to leave the stomach than a lightly boiled one; a raw egg is hardly digested by the stomach, being passed into the duodenum almost unchanged. A raw egg, therefore, is probably the

better article of diet for a stomach requiring rest. Hard-boiled eggs are much more indigestible than those lightly boiled.

Eggs are very constipating for some people. This is partly due to the large amount of lime present, and partly to the fact that absorption in the intestine goes on to such an extent that only a very small residue remains.

Some patients show a remarkable *idiosyncrasy* in the case of eggs, being unable to take any without acute symptoms of gastro-intestinal derangement supervening. Others are unable to take eggs in a plain form, but can take them in the form of a pudding or cake. If the absorption of eggs from the intestine is delayed, decomposition ensues, with production of sulphuretted hydrogen and ammonia with accompanying intestinal derangement.

Raw Eggs are of special value in the treatment of tuberculosis. They are given in the following ways:—

1. Albumin Water.

Take the white of a fresh egg, cut it in several pieces with a pair of clean scissors, add twice its volume of water, pour into a broad-necked bottle, shake thoroughly well together, and strain through muslin. This gives about 3 ounces of a clear solution, etc.

This fluid added to a beef extract—either home-made beef-tea or to one of the many beef extracts in the market (Lemco, etc.), just dissolved in hot water—makes a very nutritive solution almost indistinguishable from beef juice, and at a fraction of the cost. Egg-white water added to any of the beverages (see p. 107) makes them at once possess a decided nutritive value, and is useful especially in pyrexial conditions.

2. Prairie Oyster.

Raw eggs can be very easily swallowed by breaking the egg into a coffee cup and swallowing it at once. If this method is found difficult, a tablespoonful of white vinegar may be placed at the bottom of the coffee cup; the egg is then broken on the top of the vinegar, and a little pepper added. In this form it is known as prairie oyster, and can by

many people be more easily swallowed. Eggs taken in this form are very easily digested, and this is the best method of taking large numbers of eggs as recommended for tuberculosis.

3. Egg Flip (without wine).

White of egg ; ½ pint of hot milk ; sugar and flavouring to taste.

Beat the white of egg to a stiff froth. Pour the hot milk over the egg, stirring all the time ; add flavouring—for example, sugar, cinnamon, lemon juice.

4. Egg Flip (with wine).

1 egg ; 1 glass of port, sherry, or brandy ; 1 tablespoonful of sugar.

Separate the yolk and white. Mix the yolk and sugar well together, and beat up the white to a stiff froth. Mix the yolk with the wine, and stir in the white lightly, and serve.

5. Egg Drink (with milk or with soda water).

1 egg ; 2 pints of milk or soda water ; 1 teaspoonful of sugar ;
1 tablespoonful of sherry or brandy.

Beat up the egg, wine, and sugar, and strain into a cup. Over this pour ½ pint of almost boiling milk, and serve hot. If soda water is used, serve cold.

6. Egg Nogg.

1 white of egg ; 1 tablespoonful of cream ; 1 tablespoonful of sherry ;
castor sugar to taste.

Mix the wine, cream, and castor thoroughly. Beat the white of egg to a stiff froth, stir into the mixture, and serve.

7. Caudle.

1 egg ; 1 glass of sherry or brandy ; ½ pint oatmeal gruel ; flavouring—
lemon peel, nutmeg, and sugar.

Flavour the gruel by cooking it with the lemon peel. Beat up the egg with the brandy, sugar, and nutmeg, and pour over it the hot gruel.

Cooked eggs appear as the main basis in custards, soufflés, and omelets. They are also used with carbohydrates in the making of puddings, and for the thickening of soups and sauces.

MEATS.

Composition of Flesh.—The flesh of animals comprises *muscle* with the connective tissue, fat, nerves, and blood-vessels supplying the muscle. The length of the fibre varies in different varieties of animal flesh—for example, very short fibres are present in the breast of a chicken, and very long fibres in the limbs. For this reason the former are more easily digested.

The fibres are held together by *connective tissue*; this connective tissue yields gelatine on boiling. The amount of connective tissue is proportionate to the age of the animal, being large in amount in old animals.

The composition of meat is affected by various factors, such as the age of the animal, breed, condition, and feeding; and whether the blood has been drained off, as in veal, or retained, as in beef.

In *young animals* the muscles are not fully formed, and are more watery, so that young meat (lamb and veal) loses half to three-quarters of its weight in cooking; the muscle albumin is replaced by gelatine-forming substances, and the fats and salts are also smaller in amount. Veal is known to be very indigestible to some people, but it is useful for making soup, as the protein-forming gelatine, on boiling, produces good jelly stock.

The *best beef* is obtained from a two-year-old ox, and the best mutton from a two-year-old sheep. In addition to being more digestible, the flesh of full-grown animals is richer in extractives and has more flavour than the flesh of an immature animal; this explains why lamb is eaten with mint sauce and veal with mixed herbs.

The influence of feeding on the flavour of the flesh is illustrated in the difference between the flavour of mutton

from hill-fed sheep and from sheep fed on turnips. Wild rabbits are much more palatable than tame ones—probably on account of the aromatic herbs, such as thyme, in their diet. Seabirds have a fishy flavour, and are not easily digested.

The *chemical composition* of the meat is greatly influenced by the breed, the condition, and general health of the animal —that is, the degree to which the animal has been fattened, and also by the particular part from which the cut is made. The flank contains 43 per cent. of water, and the round of beef 60 per cent. (see fig., p. 58).

The average composition of meat is given in the following table:—

Beef.	Water.	Nitrogenous Matter.	Fat.	Ash.
Lean	76.5	21	1.5	1
Medium ...	73	20.5	5.5	1
Fat...	53	17	29	1

The nitrogenous part of flesh consists chiefly of the protein *myosin.* This coagulates after death, this condition being known as *rigor mortis.* Meat in this state is tough and indigestible; on this account meat should either be eaten immediately after killing, before *rigor mortis* has had time to supervene, or it should hang until the stiffening has passed off. In hot climates, where decomposition sets in rapidly, flesh is cooked immediately on being killed.

The serum *albumin* of muscle is one of the most soluble of the muscle proteins, and this albumin can be extracted by water; this extract, amounting to 5 or 6 per cent., represents the maximum strength of an aqueous extract of beef-tea. The remaining 14 or 15 per cent. of proteins are insoluble in water, though dissolved by the digestive juices.

It should be noted that a large number of persons who call themselves vegetarians are vegetarians only in name. They take animal foods in the form of milk, eggs, and in many instances white meats, such as fish and game. Their "vegetarianism" consists solely in abstinence from animal flesh, especially red meats.

The chief *mineral substances* present in meat are salts of phosphoric acid and potassium. Iron is present in the red colouring matter. These mineral substances are of great importance in nutrition.

The *extractives* in meat are substances which can be extracted by boiling water. They have no direct nutritive value, but are important since they impart the characteristic flavour to meat. These are more fully considered in the section on Beef-teas and Extracts on pp. 142, 382.

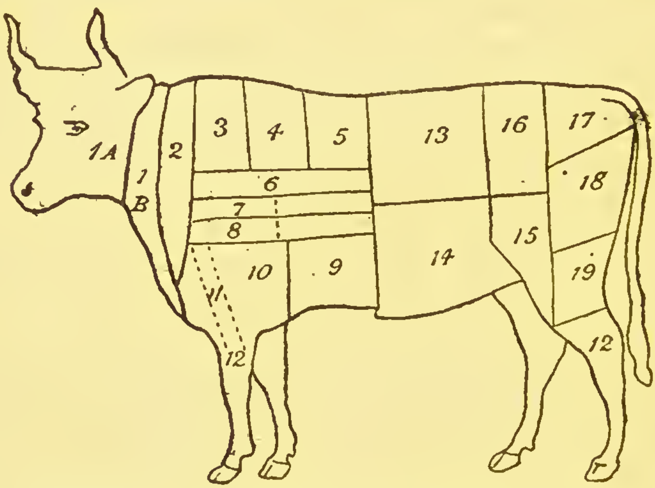
Fat is embedded in the connective tissue between the fibres in mutton and beef. Fat is almost entirely absent in game, and in the breast of chicken, and in most varieties of white fish. In pork, duck, goose, herring, mackerel, and salmon the fat is abundant. The fat lessens the digestibility of the meat, possibly by forming a coating round the fibres.

Meat should be cut or carved at right angles to the long axis of the fibre. It is then more easily chewed, the flavour is better, and the digestive juices reach the fibres more easily.

The *acids* which develop in meat while hanging improve the flavour, and also help to increase the digestibility. This effect can be brought about by various devices, such as the addition of vinegar to boiling meat, the rubbing over veal with lemon juice before frying or stewing, and by eating vinegar with crab and lobster.

Varieties of Meats.

Beef is at its best when got from an ox of two years of age. Foreign beef is now imported in large quantities, and, although it is not considered so good in flavour or quality as English meat, it is excellent, and can be obtained at a lower price. The best parts only are sent to this country; the carcasses, frozen, chilled, or refrigerated, arrive in excellent



THE USUAL SCOTCH MODE OF CUTTING UP AN OX.
(More economical than the English mode.)

condition, and are cut up and sold in the same manner as home-grown beef, thus placing good meat within the reach of all. Argentina, Australia, and the United States are the chief sources of the foreign beef.

The method of cutting up a side of beef varies in different parts of the country, and the accompanying diagram gives the usual Scotch mode, which is more economical than the English.

Names of the Various Joints, with suggestions for the best method of using, and the average English and American price per lb. :—

The best parts are the rump, sirloin, and ribs; ox fat is softer than mutton fat on account of the larger proportion of olein in it.

Chip (1*a*) *and Neck* (2).—These parts often suit if soup meat is ordered. It makes a good economical stew, and good pies and puddings if first stewed. Cost: Eng., 5d.; Amer., 3½d.

Spare Ribs (3 and 4).—Generally stewed. Cost: Eng., 8d.; Amer., 6d.

Ribs (5).—Roasting. It is generally thought most economical to have the bones taken out and the meat rolled; the bones are then used for soup. Cost: Eng., 8½d.; Amer., 7½d.

Runners (6, 7, and 8).—Cut close by the shoulder-bone; is used for boiling and stewing. The thin end is sometimes salted. Cost: Eng., 9½d.; Amer., 6½d.

Nine Holes (9).—Used chiefly for pickling, sometimes boiled or stewed, not so fat as the brisket (10). Cost, 6½d.

Brisket or Breast (10).—Used for stewing or salting; rather a fat portion, but excellent cold. Cost: Eng., 5½d.; Amer., 4½d.

Marrow Bone (11).—Very valuable for the fat it contains. Methods of preparation, see p. 420.

Hough or Shin (12).—Best for making soup, and makes a good, economical stew. Cost: Eng., 4d.; Amer., not sent to this country.

Sirloin (13).—Cut generally into three parts, called double side, middle cut, and the thin end. It is almost invariably roasted, and is considered the best joint for this purpose. The undercut is sometimes cooked separately, and is the best part for entrées, as it is so tender. Cost: Eng., 9d.; Amer., 8d.

Flank.—Thin (14); thick (15). Thin flank: May be stewed, but is rather fat. The best way is to salt or pickle it and eat it cold. An economical part; low priced. Thick flank: Coarse in fibre, but well-flavoured and tender. Economical part to buy; contains no bone or fat; can be stewed, made into puddings or pies, or used for steak, or roasted. Cost: Eng., 5½d.; Amer., 4d.

Rump (16 and 17).—Gridiron steaks should be cut from here. Excellent roasted. For stewing, steak from a cheaper part does as well. Cost: Eng., 1s. 1d.; Amer., 11d.

The Round (18). —Weighs from 30 to 40 lbs., and contains little fat; the upper part is sometimes cut into steaks. Sometimes the whole is cut into two rounds—known as Topside of Bullock—which cuts into steaks and joints for roasting; and Silverside, generally salted and boiled. It makes an economical joint if roasted, but is better boiled, stewed, or pickled and boiled.

Cheek.—Too bony to be a very cheap joint. Sold cheap, and can be made very palatable by long stewing, or is good for soup. Cost: Eng., 1s. 3d.

Ox-tail.—For soups and stews. Expensive, being considered a delicacy. Cost: Eng., 1s. 9d. each.

Cow-heel.—The feet are boiled and the neat's-foot oil extracted. These are sold by butchers; they make excellent jelly in the same way as calves' feet, or can be used for soup. Cost, 6d. each.

Veal is much less nutritious than beef, containing more gelatinous and fewer albuminous substances. In spite of its fibres being softer, experience and experiment show that it is not so easily digested as beef. When the same quantity of beef and veal are taken, it is found that the former takes two hours, while the latter takes two and a half hours to digest.

The whiteness of veal is considered a sign of good quality, and the animals are bled to make the flesh white. Veal is best when taken from an animal of eight or ten weeks old.

Veal is usually cut up by dividing the carcass into four quarters, with eleven ribs to each fore-quarter. They are used in the following way:—

Loin.—Excellent roasting joint, and also for chops. Cost, 8½d. per lb.

Fillet.—Used for braising, or for cutlets; can also be roasted. Very little bone present. Cost, 1s.

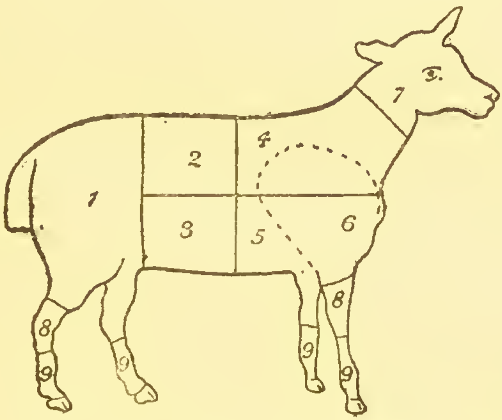
Knuckle.—Excellent for stock; can be stewed. Low priced. Cost, 6d.

Neck.—Best end gives a small roasting joint, or chops; too much bone to be economical. Scrag end is only suitable for stewing.

Breast.—Best braised or stewed. Veal tendons served as an entrée are cut from this part. Cost, 8d.

Head.—Boiled; eaten hot and cold, and dressed in a variety of ways as a delicacy. Cost, 5s.

Mutton is generally considered to be more easy of digestion than beef; this may be due to the finer fibres and looser connective tissue. The flesh of the sheep is usually much fatter than beef, and the fat is hard and solid, owing to the greater proportion of stearin. There is no doubt that hot mutton fat is irritating to some digestions. Mutton differs very greatly in quality and flavour; when of the best quality, it is a most excellent form of animal food.



THE USUAL SCOTCH MODE OF CUTTING UP A SHEEP.

Foreign Mutton.—New Zealand mutton and Canterbury lamb are now sold everywhere at prices much below English-grown meat; the quality of the meat is excellent, but the result of the freezing causes more shrinkage in the cooking.

The sheep is divided into hind-quarters (consisting of gigot or leg, and loin), and fore-quarters (consisting of shoulder, scrap of neck, best end of neck, and breast).

Leg or Gigot (1).—This is the most economical joint for a family. Legs can be bought of all weights from about 3 lbs. Mutton steaks are cut from the leg. It is best roasted, and can be boiled. Cost: Eng., 9½d.; New Zeal., 6½d.

A leg of mutton improves by hanging. It should not be in contact with other food. Before cooking, the meat can be made more tender by being smacked (beaten with a wooden roller). The probable explanation is that some of the fibres are broken.

Loin (2).—This is the best for chops and for grilling or broiling, or can be roasted entire; it is rather too fat in this way. Two loins together make a saddle—a very excellent joint, but wasteful. Cost: Eng., 9½d.; New Zeal., 5½d.

Shoulder (6).—If a large shoulder is wanted, cut it off close to the bone; if, on the other hand, the meat below is required for chops, the shoulder should be taken off by the seam. This is a good joint for roasting, but it is not so economical as the leg, and is fatter. If the shoulder is boned and rolled it is very good stewed with vegetables. Cost: Eng., 8d.; New Zeal., 6d.

Flank (3). *Brisket or Breast* (5).—Very cheap, but fat; used for soup and cheap stews. Cost: Eng., 4d.; New Zeal., 2½d.

Back Ribs and Neck (4).—The best part, used for cutlets or for boiling. Cost: Eng., 9d.; New Zeal., 5½d. The scrag end is used for broth and stews or boiling. Low-priced, not very fat, bony, and wasteful; not to be recommended. Cost: Eng., 6d.; New Zeal., 4d.

Head (7).—Used for broth, or can be braised. One head gives a large quantity of excellent broth, and the meat on the head is enough to give good helpings for two persons. Cost, 6d. each.

Shank (8).—Used for soup; sometimes stewed.

Trotters or Feet (9).—Only used by the very poor; but can be boiled with head to make more soup. Sold at 1d. or ½d. each.

Mutton suet is better for frying than beef, but it is not so good for puddings.

Lamb greatly exceeds mutton in its proportion of fat, and is correspondingly less digestible. The flesh is more watery than that of the mature animal; it does not keep well.

Home-grown lamb can be had from Christmas until the end of October. A good deal of lamb is imported from New Zealand, and is known as "Canterbury" and "hill" lamb; these are excellent.

When lamb is small it is sold in quarters. The hind-quarter, consisting of the leg and loin, costs approximately, Eng. 11d.,

New Zeal., 8½d.; the shoulder, breast and neck, and the fore-quarter, Eng., 9d., New Zeal., 7d.

The fore-quarter of lamb is preferred by many, but the leg is the much more economical part.

Tongue.—The tongue of the ox, sheep, and pig is eaten both fresh and pickled. It is very tender, and is quite suitable for invalids and children if the tender central part is used; the base contains much fat, and the fibre is indigestible. It is considered a delicacy, and is consequently expensive.

Tripe.—This is the name applied to the stomach and intestines of the ox or sheep; the mucous lining is scraped off, leaving connective tissue, fat, and muscle. The latter is very easy of digestion, and the large proportion of fat in it makes tripe one of the most nutritive diets, and most suitable for those with a weak digestion. It is rather deficient in flavour, owing to the want of extractives. The special points to be noted in the preparation of tripe will be found on p. 427.

Sweetbreads.—Under this term two distinct organs are referred to—the thymus or "throat sweetbread," and the pancreas or "stomach sweetbread." Both glands are cellular organs, held together by a loose connective tissue. They are very rapidly digested by the stomach, nine ounces being digested completely in two and three-quarter hours, while a similar quantity of beefsteak demands four and a half hours. Sweetbreads require great care in the preparation for cooking, so as to rid them of the masses of fat mixed in the connective tissue.

Liver and Kidneys.—These are compact, solid organs containing little connective tissue. They are not very digestible. The livers of the calf and lamb are the most tender.

Bones.—All the connective tissues, including bones and cartilages, yield gelatine on boiling. It is specially useful in soup-making and for making jellies.

In order to get the maximum amount of gelatine, the bones are broken up into small pieces, and cooked in the oven with a high-pressure pot.

Bones are a really cheap source of gelatine, as they contain gelatine to the extent of from 15 to 50 per cent.

The *marrow of bone* has much nutritive value. It is an easily digested fat. It can be used in the form of marrow bones or marrow toast, and has the advantage of being a very cheap food (see p. 420).

Heart.—The heart of an ox or sheep is denser in structure than ordinary beef, but forms an admirable diet for the healthy individual. It has the merit of cheapness.

Blood.—Blood is sometimes used in the form of black-puddings. It is not an easily digested food, nor is it at all palatable.

Hare, when young, is very tender, and possesses an excellent flavour. The fibres are short, and the flesh is very digestible; it is greatly esteemed for soup-making.

Rabbits, when young and cooked with plenty of gravy, are very digestible; they are the better of the addition of a little fat in the form of streaky bacon.

Poultry.—These are characterized by short, muscular fibres and a small amount of fat. The common fowl and turkey, which have a white flesh, are the most easy of digestion, being tender and of a delicate flavour. A young, well-fed chicken is the most digestible of all animal foods. Short-

Game.	Average Price.	Season.	Cheapest.
Blackcock ...	2/6 to 3/6, brace.	Aug. to Nov.	Sept. and Oct.
Ducks, wild ...	2/- ,, 3/- ,,	Oct. ,, Sept.	Nov. ,, Dec.
Grouse	2/6 ,, 5/- ,,	Aug. ,, Nov.	Sept.
Partridges ...	3/- ,, 5/- ,,	Sept. ,, Feb.	Oct. and Nov.
Pheasants ...	6/- ,, 10/- ,,	Oct. ,, Feb.	Sept.
Ptarmigan ...	1/- ,, 1/6 ,,	Sept. ,, Apr.	Oct. and Nov.
Snipe	2/6 ,, 3/- ,,	Oct. ,, Feb.	Oct. ,, Nov.
Woodcock ...	3/6 ,, 5/- ,,	Oct. ,, Feb.	...

legged fowls are more delicate in flavour; a one-year-old cock will be found too tough for roasting or braising, and only edible when stewed for soups. Barn-door fowls are less fat than, but far superior in flavour to, fowls fed in close coops. The flavour and tenderness of the flesh is also greatly increased by removal of the sexual organs—the *capon* is the term for this. Ducks and geese have more fat, are

generally richer, and have a stronger flavour than fowls. Their flesh is darker in colour, and is more difficult of digestion.

Game.—Partridges and pheasants, when young, are very delicate in flavour; pigeons less so. Grouse, woodcock, snipe, quail, ptarmigan, and wild duck have muscles with a very firm, close fibre, and on this account are generally "hung," to impart tenderness and develop flavour. The most easily digested portion is the breast.

Pig.—In use in many forms; in its uncured form it is known as pork. Pork can be produced at less cost than other meat, and consequently can be sold more cheaply.

The flesh of the pig is a cheap and nourishing food. In its uncured form it is known as "pork," in its cured form as "bacon." Pork is relatively indigestible on account of the large amount of fat present. The fat in bacon is friable, and on that account is more readily acted on by the digestive juices. Bacon is an admirable food for delicate children.

The cheaper parts of bacon range from 5d. to 9d. per pound, but on account of the bone present these are not so economical as they appear.

Hams.—Hams cost from 7d. to 1s. per pound according to the type of ham, some small English hams commanding the largest prices. The shoulder can be purchased boned and rolled, and often does duty for a ham; it is not so fine in fibre, but is much more economical, and costs from 7d. to 10d. per pound.

Sausages.—In this country these are made of uncooked meat, and various carbohydrate substances such as bread are frequently added; the vegetable matter is not infrequently disguised by the addition of colouring material. Seasonings of various sorts also enter into their composition. As sources of protein they are not more economical than

ordinary meat, and their uncertain composition makes them unsuitable for invalids.

FISH, INCLUDING CRUSTACEA AND MOLLUSCA.

There is no doubt that a large proportion of our town population would profit by exchanging some of their meat as an article of daily diet for fish.

Its greater richness in gelatine-yielding substances causes fish to lose more in boiling than meat does, and on this account boiled fish is an insipid and unattractive article of diet. The cheapest fish are cod, ling, herring, mackerel, and sprats, the cost, of course, varying with the supply.

Fish as a food-stuff contains a large proportion of water, and a varying amount of fat and protein. The latter belongs chiefly to the gelatine-forming order. Isinglass, the finest form of gelatine, is obtained from fish bones, but more especially from cartilaginous fish, like the skate and sturgeon. According to the proportion of protein and fat in fish, they may be divided into two groups of "fat" and "lean."

With more than 5 per cent. of fat—eel, salmon, turbot, herring.

With from 2 to 5 per cent. of fat—halibut, mackerel, mullet.

With less than 2 per cent. of fat—cod, whiting, haddock.

Fish are at their best just before spawning, when they are said to be in season; later they become poor and flabby.

The perfection of fish-cooking is obtained when the fish is transferred immediately from the water to the pot. Keeping in ice deteriorates the flavour. Skate and sturgeon are exceptions; they improve by being "hung," the muscular fibre becoming softer. Smoked, salted, and pickled fish are much less digestible than when fresh, and in this form they are

better avoided by dyspeptics. The fish best suited for smoking are firm, oily fish, like the salmon and herring.

In selecting fish, the following are the main indications of freshness: The flesh is stiff and firm, the animal being in a state of *rigor mortis;* the skin should be well covered with scales, and there should be no disagreeable smell. A most important point is that the eyes and gills are bright, while the tail is firm and not drooping. Cod, haddock, and whiting keep best, then flat fish; mackerel and herrings very rapidly get soft.

Varieties.—The edible fishes fall into two groups—"white" and "oily"—the difference being as to whether they have the fat stored in the liver or distributed throughout the body.

The white fishes are the most digestible; they comprise the whiting, haddock, cod, brill, sole, plaice, flounder.

The *whiting* has been termed "the chicken of the sea." It is very light, easily digested, and when fresh possesses a very delicate flavour.

Haddock, when fresh, possesses a very delicate flavour; the flesh is firmer and harder than whiting. It is best to select one of medium size; when large, their flesh is coarse. Smoked haddocks are very well known, and vary greatly in digestibility. The small sort, known as the "Aberdeen Findon," are quite tender; they are smoked with peat smoke. The Arbroath smokies are also easily digested. The larger forms, smoked with petroleum, are tough, and have not nearly so fine a flavour. In season August to January.

Cod is the toughest of the white fish. Its quality varies at the different seasons; sometimes the flesh is hard and full of fibre. The tail portion is the most digestible, but has least flavour. In season September to April.

Ling.—A cheap fish, rather tasteless; requires a good sauce; frequently bought salted. In season November to April.

Trout.—A fresh-water fish. Those weighing about one pound are best. When in condition have excellent flavour, and are very digestible. In season February to August.

Smelts.—A very small fish, but much esteemed. In season October to April.

Whitebait.—A very small fish, of silvery appearance; must be used quite fresh. Best in May, June, and July.

John Dory.—The flesh is rather tough, and it is the better of being kept a day or two before being cooked. It is best baked.

The flat fishes form another section of the white fishes, and comprise:—

Sole.—Very delicate, and easily digested. It is a fish of excellent quality; medium size is best. In season May to February.

Plaice and Flounders.—Flat fish of rather poor quality and flavour, easily digested; moderate price. Choose one with a thick, firm body. They are best fried or baked. In season September to April.

Skate.—Tough; a very decided flavour; improves with keeping for a day or two. The flesh should be firm and creamy in appearance. It requires to be skinned; unwholesome when out of season. In season November to April.

Brill.—Like turbot in appearance, and much cheaper. When fresh, the flesh should be of a yellowish tint; if blue, it is not good. It is generally boiled.

Halibut resembles turbot in appearance. Its flesh is of excellent flavour. A middle cut of this fish is the best. In season October to March.

The oily fishes comprise:—

Turbot.—The richest of the flat fish. The flesh is firm and white. A medium-sized fish is the best. This fish improves by keeping for a day. In season September to April.

Salmon.—A red fish; this is very rich in fat, which is found most abundant on the under side. Its flesh is so rich that most people require a corrective such as vinegar or other acid sauce. The more freshly a salmon is cooked the better. In season February to September.

Eel is exceptionally rich in fat, the proportion being about double that of proteins. Although oily it is readily digestible, and possesses a delicate flavour.

Herring is the cheapest and most abundant of the oily fishes. This fish should be cooked fresh. When newly caught they have a bright and silvery appearance. Herring are much used in the salted and smoked

forms. When smoked for an hour or two they are called "bloaters." As the smoking continues they become "kippers," "red herring," or "black herring." In season May to December.

Mackerel readily taints, and gives rise to symptoms of ptomaine poisoning if eaten in this condition. The mackerel seasons are spring and autumn; the latter fish are the finer. *Sardines, sprats,* and *pilchards* belong also to this group of fish. In season October to June.

Crustacea.—The edible forms of Crustacea are lobster, crab, crayfish, shrimps, and prawns.

The lobster and crab consist of two distinct parts. The flesh which is contained in the claws, legs, and tail is very indigestible, mainly on account of the density and coarseness of the fibres. The habit of eating vinegar with lobster and crab is perfectly sound, the acid helping to soften the fibre. The body of these animals is also eaten. This is composed mainly of liver; it contains a considerable quantity of fat.

Lobster.—The lobster is more digestible than the crab; the flesh of the claws is better than that of the tail. It decomposes rapidly, and therefore is best bought alive. The bright red part within the body is the ovary. Their spawn is very nutritious, and is often used in sauces for the sake of its flavour and colour. In season January to October.

Crab is inferior to lobster. The flesh is tougher and more indigestible; the medium-sized ones are best. Choose a heavy one, for if light it is watery. In season April to September.

Crayfish.—Used principally as a garnish, or for making soup. Like lobsters in appearance, but smaller and of more delicate flavour.

Shrimps and prawns can scarcely be classed as a food. They are best cooked in salt water. They are taken as "appetizers."

Mollusca are represented by the oyster, mussel, whelk, periwinkle, and cockle. Oysters are in season from September to April. There are several kinds; the "natives" are considered the best.

The composition of the **oyster** is mainly water—over 88 per

cent.; protein, 6 per cent.; and carbohydrates, 3 per cent. The proportion of solid nutriment is not large, three dozen moderate-sized oysters only containing 5⅓ ounces of solids. When eaten raw, oysters are an exceedingly easily digested food, three medium-sized oysters being completely digested in three-quarters of an hour. Cooking tends to make them tough and leathery. If oysters are grown in the mouths of rivers, they are liable to be contaminated by typhoid or other germs in the sewage.

III.

VEGETABLE FOODS.

Cellulose.
Starch.

SUGARS.

Sucroses.
Glucose.
Invert Sugar.

VEGETABLE FOODS PROPER.

SEEDS AND FRUITS.

Cereals Producing Flour or Meal.

The Cereals.

Wheat.

Flour.

Preparations of Wheat other than Flour.

Other Cereals.

Barley.
Maize or Corn.
Buckwheat or Blackwheat.
Millet or Sorghum.
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LEGUMES OR PULSES.

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FRUITS, NUTS, AND FUNGI.

Fruits.

Fruits.
When to eat Fruit.
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Preserving and Cooking of Fruits.

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Nuts.

Fungi.

ROOTS AND TUBERS.

STEMS AND LEAVES—GREEN VEGETABLES.

Chapter III.

VEGETABLE FOODS.

THE large and varied class of food-stuffs derived from plants have a strikingly common feature as far as their chemical composition goes. They are all very rich in carbohydrates, and as a rule are poor in fats. They contain vegetable proteins in different proportions, and also an abundant proportion of water.

Vegetable proteins exist as vegetable albumin and vegetable casein. They are not so easily digested and assimilated as animal proteins. The proteins in peas and beans are rich in sulphur, and are therefore prone to induce flatulence.

Though there is no true *gelatine* substance in carbohydrates, there is a peculiar group of bodies known as "pectoses." These substances give to fruits their power of forming jellies when boiled.

On the whole, plant life is not rich in fats. The fat resembles in chemical composition the animal fats, but contains, as a rule, more of the oily constituent (olein) and less of the solid components. The solid vegetable fats are cocoanut oil and cocoa butter, none of which are in great use as foods.

Vegetable butters are now made from mixtures of these fats, and closely resemble cooking and table butter. In

addition to the oils obtained by pressure, most plants contain volatile or essential oils, to which they owe their fragrance. These are mainly used in perfumery, but they enter also largely into flavouring agents, and act as condiments to excite the appetite and stimulate the digestive juices.

The *salts of plants* exist largely as salts of potash and phosphorus; in many of the cereals—for example, wheat—iron is also present in combination with phosphoric acid. Chlorides are relatively deficient in vegetable foods, hence the custom of adding sodium chloride (common salt) to vegetable dishes.

The *carbohydrates* form the great bulk of vegetable food, and are represented by cellulose, starch, and sugar. There is a framework of cells and binding tissue known as *cellulose*; *starch* is the substance stored in the cells; and *sugar* is the partially digested starch which circulates through the plant. These will be shortly considered.

Cellulose.—When a plant is young some of its cellulose can be digested by man; but as the plant grows older the cellulose becomes more woody in structure and gets enveloped in resinous material, so that it is as indigestible as paper or sawdust. It is this peculiarly insoluble envelope that makes the cooking of the vegetable group so important for digestion.

The nutritive parts of the plant are the *starch*, which is stored up in the cells, and the *sugar*, which circulates through the framework. The starches and sugars are convertible; the sugar is the digested nutriment of the plant, while the starch is the form in which the nourishment of the plant is stored for further use. All starch eaten by animals has first to be converted into sugar before it can be utilized for the needs of the body.

Starch is made up of a number of minute cells. The starch granules show concentric markings, showing that the

cells have been built up layer by layer. Starch grains are insoluble in cold water; when boiled, the starch grains swell up and burst the cellulose envelopes, and form, with water, the sticky substance used in laundry work. Cooking is essential for vegetable foods, in order to rupture the starch granules so that the broken-up grains may be brought more readily into contact with the digestive juices.

SUGARS.

Sugars are crystallizable carbohydrates, with oxygen and hydrogen existing in proportion to form water. There are several varieties of sugars—for example, cane sugar, grape sugar, milk sugar, and malt sugar. They present slight differences in their physical properties, and also differ in taste and digestibility.

Sugars have essentially the same use as starches, for all starch must be converted into glucose or dextrose before it can be made use of in the body. Cane sugar requires to be converted into grape sugar before it is absorbed, and therefore grape sugar may be considered a predigested carbohydrate.

Sugars are of value as energy and heat producers, and they can also be transformed into fat; they are, however, not essential, and can be replaced by starches and fat. Practically it will be found that all growing children crave for sugar, and this should be supplied in moderation. Sugar also lessens muscular fatigue. Muscular action is dependent on the presence of glucose and dextrose, and so urgent is the demand for sugar that if it or starch be not present in the food, then sugar is formed from the muscles. Sugars and syrups are used to preserve fruits in solution, or in the dried form as preserved cherries and crystallized ginger.

There are three groups of sugars :—

1. *Sucroses*—for example, cane sugar, malt sugar, and milk sugar.

2. *Glucoses*—for example, grape sugar (dextrose), fruit sugar (or levulose).

3. *Invert sugar*, best known as honey.

1. **Sucroses.**—(*a*) *Cane sugar* is the clarified and crystallized juice of the sugar cane, but may be made also from beetroot. Commercial sugar is extracted from sugar cane and the juice of the compressed betroot by a process of refining which produces commercial white sugar of various grades.

Coarse brown sugar is somewhat impure, and has a slightly laxative action ; it is not cheaper than the more refined varieties.

Maple sugar is derived from the sap of the sugar maple of North America. The bark is tapped in early spring, and allows the sap to escape as it flows upwards. The sap is evaporated, the sugar crystallizes out, and the residue is used as maple syrup.

There is no commercial difference between maple sugar and the other two described above, but it contains certain ethereal substances which give it its peculiar flavour. Maple sugar is chiefly used as a confection.

Molasses, *treacle*, and *syrup* are by-products formed during the process of refining the above sugar ; and all contain—besides sugar—acids, extractives, salts, and more or less impurities.

Heat applied to sugar makes it change its crystalline form. When strongly heated it melts into a yellowish liquid, and on cooling it does not crystallize, but forms a transparent, brittle mass, familiar as barley sugar. Sugar candy is made by extremely slow crystallization. Caramel is made by heating refined cane sugar to about 400° F., when it is melted, browned, and converted into a non-crystallizable fluid with a distinctive "caramel" flavour. Caramel may be added to insipid invalid foods, such as milk, custard, farina, arrowroot, and the like.

(*b*) *Maltose.*—Malt sugar is formed in the process of malting. The grain is roasted in the kiln until it shows signs of sprouting, when the temperature is raised to prevent further growth. The grain is now called malt, and is brownish, some of the starch having been changed into dextrine and part of it into sugar. The object of the malting is to

convert the insoluble starch into the soluble sugar and dextrine (see "Malt Extracts," p. 58).

(*c*) *Lactose*, or milk sugar, is the carbohydrate of milk. It differs from cane sugar in its flavour, being almost tasteless. It is hardly possible to ferment it by yeasts. It is therefore very useful in cases of fever and of stomach derangement with fermentation. It is readily split up by micro-organisms to form lactic acid.

(*d*) *Mannite* is obtained from the sweet juice of the stems of the ash tree; it is found also in beetroots and some other vegetables. Like sucrose, it crystallizes and is white. It does not ferment with yeast. It is laxative, and may be used in diabetes, not being excreted in the urine as glucose.

2. **Glucose**, or grape sugar, is present in almost all fruits. Grape sugar is known by the name of dextrose. When grapes are dried to form raisins, the little dried masses on the outside are dextrose. Commercial glucose is usually obtained by boiling starch with acid, and it is sold in syrupy form. When heated it turns brown, and is used as sugar colouring. Confectionery and sweets are made from cane sugar or glucose (grape sugar), with the addition of butter or other fats, nuts, fruits, starch, and flavouring extracts. Glucose mixed with egg albumin is largely employed by confectioners in the preparation of icing and fondants.

Levulose, or fruit sugar, is found in most fruits. It is difficult to crystallize. It is now sold under the name of "Diabetin," for the use of diabetics, on the ground that it is better borne than any other form of sugar. Diabetin is sweeter than cane sugar, and has a somewhat fruity taste. It may be taken in considerable quantities without disordering digestion, as saccharin is apt to do.

3. **Invert Sugar** is a mixture of dextrose and levulose. A large proportion of cane sugar is converted into invert sugar in the process of jam-making. Honey is "an invert sugar" prepared by bees from the cane sugar of flowers; the insect transforms a part of the sugar into dextrose. It is a wholesome, fattening food. Artificial honeycombs are now made from paraffin stamped into cells, which allows the bees more time for the storage of honey. Run honey is mixed with fluid glucose and sold as honey; it is innocuous, but should be sold at a cheaper rate.

Saccharin and dulcin (sucrol) are chemical substitutes for sugar. They have many hundred times the sweetening power of sugar, but are of no use as foods. They are used to replace sugar as a flavouring agent in diabetes, gout, and obesity.

Sweets in moderation are good for growing children. There is no proof that sugar is harmful to the healthy; although, doubtless, sweets which adhere to the teeth undergo fermentation with the production of acids which attack the teeth.

VEGETABLE FOODS PROPER.

Almost every part of plants furnishes food, but more especially seeds, roots, stems, leaves. These may be classified as follows :—

Seeds and Fruits.	*Tubers and Roots.*	*Stems and Leaves.*
Cereals—for example, wheat, oats, barley, rye, rice, maize, etc.	Tubers—for example, potatoes.	Green vegetables.
Pulses — for example, peas, beans, lentils.	Roots — for example, carrots.	
Fruits.		
Nuts.		

SEEDS AND FRUITS.

Cereals producing Flour or Meal.

The **Cereals** (from Ceres, goddess of corn) comprise all grains or corn-bearing plants. They contain from 5 to 14 per cent. nitrogenous matters, chiefly in the form of gluten; they contain from 50 to 80 per cent. of starch. The proportion of fat varies in different members of the group, ranging from $\frac{1}{2}$ to 8 per cent. Salts are present in amount to about 2 per cent.; this amount depends largely on the kind of soil and manure employed. They consist chiefly of phosphates of soda and potash, with lime and magnesia, and a little silica and iron. The organic salts are almost absent.

COMPOSITION OF CEREALS.

	Water.	Protein.	Fat.	Carbo-hydrates.	Cellulose.	Mineral.
Barley	12.3	10.1	1.9	69.5	3.8	2.4
Buckwheat	13.0	10.2	2.2	61.3	11.1	2.2
Maize	12.5	9.7	5.4	68.9	2.0	1.5
Millet	12.3	10.4	3.9	68.3	2.9	2.2
Oats	10.0	10.9	4.5	59.1	12.0	3.5
Oats, hulled	6.9	13.0	8.1	68.6	1.3	2.1
Rice in the husk (paddy)	10.5	6.8	1.6	68.1	9.0	4.0
Rice, polished	12.4	6.9	0.4	79.4	0.4	0.5
Rye	11.0	10.2	2.3	72.3	2.1	2.1
Wheat	12.0	11.0	1.7	71.2	2.2	1.9

Wheat and rye, owing to peculiarities in their gluten, are the only ones suitable for bread-making, but all of them can be made into cakes, porridge, puddings, or soup.

The process of grinding first removes the outer coats of cellulose, and an unbroken meal or flour is obtained. The gluten lies next the outer surface.

The cereals contain a great excess of carbohydrate, and mankind has instinctively added fat and protein; so that we eat butter with bread, milk with porridge, and make cereal puddings up with eggs and milk.

Wheat.

The first place among the cereals must be assigned to wheat.

Flour.—In order to transform wheat grains into a useful domestic substance, the grains have to undergo the process of grinding or milling. It is necessary, in order to follow the processes of grinding, to have some knowledge of the different parts of the wheat grain. These are:—

1. Husk, or cuticle.
2. Kernel, or food supply.
3. Germ, or young plant.

The *husk* consists of three layers, consisting mainly of cellulose with some pigment. When the wheat is decorticated the product is known as bran. Wheat bran contains about 15 per cent. nitrogen, 3.5 per cent. of fatty matter, and 6 to 7 per cent. of mineral matter, mainly phosphates, all of which materials should be nutritious; but very little bran can be absorbed, and it is irritating except to patients with a robust digestion.

The *kernel*, or endosperm, consists of the nutritive material for the young embryo, and makes up 85 per cent. of the grain. Microscopically it is found to consist of a honeycomb of cellulose, into which are packed starch cells and gluten granules. *Gluten* is a protein which has the peculiar property of becoming viscid when mixed with water. This important feature will be mentioned again under "Bread-making."

The *germ*, or young plant, represents 1½ per cent. of the whole grain. This is very rich in nitrogen and fat. The germ as well as the bran is removed in the preparation of flour, for the following reasons. The abundant supply of fat in the germ may become rancid, and so spoil the flour, and the soluble proteins present are apt to act on the starch of the flour, converting part of it into soluble forms (dextrose and sugar), which darken in colour in the oven and detract from the appearance of the cooked flour. Thus, in the process of milling to which the wheat is subjected, its different parts are broken up and various mill products are produced. The outer coats yield bran, fine pollards, sharps, and middlings; the germ is removed as offal, while the flour is derived solely from the kernel.

Flour, according to the amount of grinding, is yellowish white from the presence of gluten, or pure white, in which case it is likely to contain little except starch. Good flour should have a pleasant smell, and should have no acid or

rancid taste. It should not contain more than 15.2 per cent. of water. The flour itself is classified and divided into two parts—the larger part, known as "bakers" or "household;" and a smaller portion, very white in colour, and therefore poor in proteins, known as "patents." From the latter genuine Vienna bread is made, and also the best class of fancy breads and pastry.

By removing the germ and the bran the most useful constituents of the wheat are lost—namely, germ protein and fat, and the bran minerals and protein matter. Whole wheaten meal baked is more nutritious, much better flavoured, but is apt to be irritating on account of the indigestible outer coat, consisting of cellulose and silica, etc.; and while it is useful as a laxative, its use has not become general. (The prejudicial effects of bleaching flour are referred to on p. 169.)

Other flours are obtainable where only the two outer layers of the husk are removed. Bread made from these is not nearly so indigestible as bread made from whole wheaten meal.

Two patent processes have also been devised to prevent the waste. Smith's patent takes the separated germ and partially cooks it by means of superheated steam. This kills the ferment, which otherwise acts on the starch, and at the same time sterilizes the fat, and so prevents it becoming rancid. The germ so heated is ground to a fine meal, and of this one part is added to three of ordinary flour, and the mixture is known as *Hovis flour.* It is much richer in protein and fat than ordinary flour. There are now several germ breads on the market, in all of which the germ is treated much along these lines. The *Frame food* process treats the bran. The bran is boiled under high pressure; the mineral matters and part of the nitrogen are recovered. The watery extract is filtered and evaporated to dryness. This is Frame food extract. This extract forms the basis

of preparations made by the Frame Food Manufacturing Company.

(For bread-making and varieties of bread, see chapter on "Cookery," p. 386.)

Preparations of Wheat other than Flour.

The wheat grain may be used as a food in its entirety. It is soaked in water till it swells up and bursts. It is then boiled in milk with the addition of sugar, so forming a nourishing dish called *frumenty*.

Wheaten groats are made by crushing, and this can be made into porridge, used like oatmeal.

Wheatena is a nutritious food containing all the wheat germ excepting the husk, and is finer than crushed wheat and more easily digested. The starch granules are partially cooked. It is eaten as a porridge.

Granose and *Granola* are flaky forms of the entire wheat grain. They are palatable and nutritious, are ready cooked, and are eaten with cream or hot milk.

Shredded wheat, *trisket*, and *pulled bread* are all prepared much the same way. The shredded wheat biscuit is made of wheat thoroughly cleansed and cooked, and treated by machinery, which draws out the wheat kernels into long continuous filaments, without separation of the parts. The shreds are folded into oblong biscuits, which are cooked at successive temperatures until they are quite dry and ready for use. They may be eaten with butter, or soaked in milk, cream, or soup. They are easily digested. They require mastication, and are quite palatable.

Farina is a general name meaning flour, but sometimes it is also applied to potato flour, which forms a jelly like arrowroot when cooked.

Farola is another granular preparation, but is made from the endosperm or germ, and is specially rich in proteins and mineral matters.

Florador, another granular wheat preparation, is recommended for puddings and shapes. It is certainly more nutritious than cornflour.

Semolina is prepared from the central part of hard wheat, and is rich in gluten. It contains about 11 per cent. of protein, or half the amount contained in an equal amount of beef. It is thus a fairly rich nitrogenous food, and is used for making puddings and for thickening soups.

It is also used extensively in the manufacture of the alimentary pastes, such as macaroni. *Macaroni*, *vermicelli*, *spaghetti*, etc., are made from mixing different flours rich in gluten—for example, semolina. The flour is made into a paste, kneaded, put into a cylinder the bottom of which is pierced with holes. A piston descends in the cylinder, and the paste comes out from the perforations in the form of long tubes, which are cooled, cut in lengths, and dried. It contains from 16 to 18 per cent. of gluten, as against 10 and 15 per cent. in the case of white bread.

Weight for weight, macaroni may be regarded as not less valuable for flesh-making purposes than beef or mutton. Most people can digest it easily and rapidly. After thorough soaking, and when well cooked by boiling or stewing in milk or stock, it is very nutritious, and it is often served combined with cheese. The other pastes are much the same in composition. They are wholesome but tough, and require prolonged cooking. (For various means of preparation, see ch. xxii.)

Other Cereals.

Barley contains more salt, fat, and cellulose than wheat, but less protein and carbohydrate. The ash of barley is rich in phosphates and iron. The proteins resemble those of oats, and do not form gluten. It cannot, therefore, be made into bread, but is used as barley scones and barley-meal porridge.

In the preparation of barley the whole grain is ground to form barley meal. When stripped of the husk and roughly ground, it is called pot barley or milled barley; when the grains are further rounded and polished, it is known as pearl barley. In the form of barley broth it forms a common article of diet.

Barley-water, made from pearl barley or Robinson's patent barley, is a useful sedative in all irritable states of the urinary passages. Barley-water is often added to cow's milk in infant feeding (see ch. xxii.).

Maize, or **Corn**, may be dried, parched and roasted, whole, or ground into meal of various degrees of fineness. Its

chemical composition shows it to contain a considerable amount of fat and protein as well as starch, and it furnishes abundant energy and heat. It is very fattening both for man and the lower animals. There are innumerable varieties, but the common kinds are known as white, yellow, and red. As a fresh vegetable, sugar corn, unless eaten very young and tender, is indigestible; and canned corn is notoriously so, chiefly on account of the husk of the kernel. The chief preparations are :—

Cornmeal.—This is digestible, and, like oatmeal, somewhat laxative. It makes a dry, friable bread, for it contains no gluten. As compared with wheat flour, it contains more fat, but is deficient in salt. It is not largely used in this country.

Polenta.—A maize meal largely used by the Italians.

Corn starch is very white and soft; contains 53 per cent. of starch; contains proportionately little nourishment. May be used instead of arrowroot, and is sold as "maize cornflour."

Indian meal is yellow, granular, and coarser than corn starch.

Hominy, *cerealine*, and *samp* are preparations of broken or split maize of various degrees of fineness. Samp is very coarse, and can only be used when well boiled. The first two make excellent puddings.

Cornflour, *Maizina*, *Oswego.*—These are made from maize by washing away the protein and fat. They contain very small quantities of nitrogen, and are therefore only agreeable forms of starch, and are generally taken with a protein and fat, such as eggs and milk.

Popcorn.—A small variety of maize that is roasted and swells up and bursts. It is then known as popped popcorn. It is the basis of many sweetmeats.

Mush is made of well-grown Indian meal or cornmeal boiled in salted water. It mixes well with cream, and is very digestible and nutritious.

Buckwheat, or **Blackwheat**, is used in Russia, Siberia, and Brittany. The meal has less protein and more carbohydrate than flour. It is usually eaten as porridge, and can be made into griddle cakes. It is not used in this country.

Millet, or **Sorghum**, is used in Africa, Southern Europe,

and in China, but not in this country. It is similar in composition to buckwheat. White sorghum is a grass or corn, and can be converted into a flour—"dhoora"—much used in India. A fine quality of alcohol may be made from it. In the United States it is grown chiefly for molasses and syrup, and sugar is made from it.

Bread made from millet or sorghum meal when warm is fairly palatable and nutritious, and is used in China. When it becomes cold it darkens and crumbles.

Oats contain more protein and fat than flour and meal from other cereals. Starch is present in the proportion of about 38 per cent. There is great difficulty in completely getting rid of the husk, so a good deal of cellulose is left in the meal in the form of sharp particles. Oatmeal is obtainable in coarse, medium, and fine varieties, the two latter being those in household use. Oatmeal is not a suitable diet for subjects of a weak digestion, but for constipation oatmeal is an excellent article of diet. It is an excellent food for the growing child. In some subjects it heats the blood, causing rashes and gastric derangement.

If oats are simply cleaned and ground, the result is oatmeal of various degrees of fineness. *Oat flour*—for example, Scott's oat flour—is the product after the branny particles are removed. This is the best form for infants and invalids. Groats—for example, Robinson's groats—consist of oats from which the husk has been entirely removed.

Rolling oats is another method of preparation. *Rolled oats* are more easily softened by cooking; probably the great pressure between the rollers breaks down the cell envelopes. In some of the rolled oats preparations heat is also used. This requires less cooking in the house, and sterilizes the fat, so that there is no fear of the abundant fat present turning sour and altering the flavour. "*Rolled oats*," *Quaker oats*, *Avenine*, *Provost oats*, and *Porage oats* are all examples of this preparation.

Oatmeal is unfitted for bread-making owing to the absence of gluten. It is made into oatcakes by mixing the meal with water, fat in the form

of dripping or butter, and salt. Made into cakes and baked on the girdle in the form of bread-stuff, it is much used in Scotland as a breakfast bread-stuff, and can either be home-made or bought in tins. Oatcake is as nutritious as bread, and has a great deal higher food value.

Oatmeal needs prolonged boiling to soften the cellulose. For persons with limited digestive power oatmeal should be cooked so as to acquire a consistence which enables it to pour readily, and on cooling it should form a soft, gelatinous mass. (For making of gruel and porridge, see ch. xxii.)

Brose is an old Scottish dish made by stirring oatmeal into boiling water. It is not a food for a delicate digestion.

A soup-plateful of porridge is equivalent in protein to two slices of a large loaf three-quarters to one inch thick; if the bread is buttered, it would be equal in food value to a plateful of porridge and one-third pint of good milk.

Rye may be said to stand very close to wheat in importance as a food. It is in use in Europe, and mainly in Germany. In Germany the rye production is double that of wheat, and in Russia it is even greater.

Rye flour yields a coarse, dark, less well-raised bread than wheat, but is equally nutritious, though not so digestible. It contains less gluten than wheaten bread, and it takes less time to raise and bake it, provided the oven is hot. If properly made it is easily assimilated, and to many people its flavour is agreeable.

Rye is often combined with wheat in France under the name *méteil*, and the Spaniards combine it with barley. Rye flour is poorer in protein than a wheat flour of a similar grade. It is very apt to be attacked by the fungus known as ergot, which causes the grain to swell up and become dark purple.

Rice is the cereal which contains least protein and fat; it contains 76 per cent. starch. Rice, when boiled, swells up and absorbs nearly five times its weight of water, while some of the mineral constituents are lost in the water. It should therefore be steamed, or, if boiled, the water it has been

boiled in should be used as stock. Rice water makes a cooling drink. Rice is only moderately easy of digestion, and often gives rise to flatulence.

Its poverty in protein and fat does not adapt it for an exclusive food. It is rarely taken alone, but is usually taken with other foods, such as milk, curry, and the like.

It cannot be made into bread, but rice flour is often added to wheaten flour. Rice forms the staple food of about one-third of the human race. The whole grain is called paddy, and is coloured in various shades of yellow. When this coloured skin is removed the grain is known as rice.

LEGUMES[1] OR PULSES.

Peas, Beans, Lentils, etc.

The ripe seeds of pulses rank next to cereals in importance as vegetable foods. In respect of nourishment they are practically equal. They are especially rich in nitrogen, the chief proteins being legumin or vegetable casein. They are also rich in starch, but deficient in fats. They are richer in salts than cereals, especially in potash and lime, but poorer in magnesia and phosphates. They contain much cellulose.

The *protein* present is rich in sulphur, which tends to produce sulphuretted hydrogen and similar compounds, so that a leguminous diet tends to cause flatulence. Pulses are rather indigestible on account of the leathery external envelope which they possess when old. Hence they require prolonged cooking in order to promote digestibility. They require to be cooked in soft water, since the lime and magnesia found in hard waters form insoluble compounds with legumin. An analysis of the chief pulses is given by

Bauer as follows, the average composition of wheat being given for comparison :—

	Water.	Protein.	Fat.	Starch.	Cellulose.	Ash.
Peas.........	14.3	22.6	1.7	53.2	5.4	2.6
Beans.......	13.6	23.1	2.2	53.6	3.8	3.5
Lentils......	12.5	24.8	1.8	54.7	3.5	2.4
Wheat......	13.5	12.4	1.7	67.8	2.6	1.7

They are a cheap and efficient means of supplementing the deficiency of nitrogen in a vegetable diet; and, on account of the large amount of proteins they contain, they are admirably adapted as a food for the poorer classes. Their defects as compared with the cereals are their relative indigestibility, their unsuitability for bread-making, and their less agreeable taste.

Beans.—There are several varieties. The chief are :—

1. The kidney or haricot bean.
2. The broad or Windsor bean.
3. The scarlet runner.

Haricot beans almost rank first among vegetables as a nourishing article of diet. They hold their own against the beef and mutton of the animal kingdom. By most stomachs haricots are more easily digested than meat, while the comparative cost is greatly in favour of the former. The average composition of the haricot is as follows :—

Water	13.6	per cent.
Proteins	23.1	,,
Fats	2.2	,,
Carbohydrates	53.6	,,
Cellulose	3.8	,,
Ash	3.5	,,

Haricot beans are only good when fresh, and the younger they are the better. When old they require prolonged boiling. If old beans are not tender after half an hour's boiling, they should be made into a purée or pudding, dishes which are only suitable for a strong digestion. They

must be eaten immediately after cooking. A stew made up of one part meat with ten parts of haricots is a much more nutritious and wholesome diet than a stew of all meat and no haricots. They are very useful for thickening soup or using as a salad, flavoured by adding tomato or similar vegetables. Beans form the basis of a great many useful and inexpensive vegetarian dishes.

The "*scarlet runner*" is chiefly used as a green vegetable, being served up in the pods under the name of "*haricots rus*."

Soya beans are specially rich in proteins, contain a large amount of fat, but are deficient in starch. They are largely used as a bread substitute in diabetes. Several varieties of cheese are made from their vegetable casein.

Butter beans resemble small haricots, but are finer, and boil down more quickly. They make a rich white soup, and may be used for savouries. They are also very good as a simple stew.

Lentils are one of the most nutritious pulses. Their general composition is as follows :—

Water	12.5	per cent.
Proteins	24.8	„
Fats	1.8	„
Carbohydrates	54.7	„
Cellulose	3.5	„
Ash	2.4	„

They contain little sulphur, and are therefore less liable to cause flatulence than peas or beans. They have the further advantage of being specially rich in iron. There are two kinds of lentils, German and Egyptian. The former are green or olive coloured; the latter are red, and smaller than the German. The German lentils are very savoury, and have a "meaty" flavour. Either kind can be used for making excellent soup and purée. Like all legumes, they require to be steeped in water for twelve hours before boiling. They are sold as split lentils and also as lentil flour. They are an economical as well as a highly nutritious food.

Revalenta arabica is a patent preparation, composed largely of lentil flour mixed with pea or bean meal, to which oat and barley meal are sometimes added.

Peas. *Varieties of Fresh Peas.*—Fresh peas are sweetish, and should be cooked by boiling in water with a little salt; when old they lose water, become very dry, and require prolonged steeping so as to soften them. When old they lose their colour, and copper is sometimes added as a preservative, and cases of copper poisoning have been ascribed to this source. Garden peas are sometimes served up in an immature state, with the pods included, as "*haricots rus.*"

Dried peas are met with in two forms—the split yellow pea and the dried whole green pea. Split peas are chiefly used to make pea soup, or are ground into pea flour or pease meal, from which pease brose and pease puddings are made. Pease brose is made from the fine flour of the white pea by forming it into a mass merely by the addition of boiling water and a little salt. It is eaten with milk or butter, and is a good nourishing article of diet, specially suitable for persons with a costive habit. Pease pudding is made by soaking a quart of peas in water for twelve hours, throwing away those found floating on the top, The peas are then drained into a pudding cloth, put into cold water, and boiled from two to three hours till tender. They are then rubbed through a wire sieve. About one and a half to two ounces of butter, with some pepper and salt, are then added to the mass, which is then tied up again in a cloth dusted with flour, and boiled for another hour, when it is ready for serving. This is a cheap food for persons of robust digestion, but the cost of cooking adds materially to the price.

The **Pea-nut** is not a nut, but a legume. It resembles nuts in the large percentage of fat in its composition. It is used largely as a diabetic food, and it also enters largely into the composition of the patent food "Nutrose."

FRUITS, NUTS, AND FUNGI.

Fruits.

Fruits are composed largely of water, with sugar starches, organic acids, pectin, cellulose, and essential oils. Some fruits contain a little protein, chiefly as albumin.

Fruits are valued chiefly for their water and their vegetable acids, free or in combination as salts, upon which their valuable properties as antiscorbutics depend. The organic acids in the case of fruit are rich in potash salts, and contain also those of lime, magnesia, and iron; apples, and more especially strawberries, have also much soda. Fruits contain a vegetable jelly which forms the main constituent of fruit jellies.

Fruits may be classified as follows :—

1. Apple, pear, quince, guava.	Pears and quinces less digestible than apples. Guavas make good table jelly.
2. Orange, lemon, lime, grape-fruit.	Small unripe oranges are used in making curaçoa.
3. Stone fruits—for example, plum, peach, apricot, cherry, olive, date, prune, sloe.	A special variety of plum forms, when dried, the medicinal prune. Peaches, apricots, and nectarines contain less sugar than most fruits, and are useful in diabetes. Dates rank high in nutritive value; they contain 50 to 60 per cent. of sugar. Olives are little used except as appetizers. Figs are also highly nutritious, containing 50 per cent. of carbohydrates, and 3 to 4 per cent. protein.
4. Acid fruits—for example, grape, gooseberry, currant, cranberry.	A grape cure is sometimes used for constipation and obesity. Raisins are dried grapes.
5. Fleshy fruits — for example, strawberry, raspberry, blackberry, mulberry.	Largely used for jams and beverages. *Note.*—Frequent idiosyncrasy against strawberries.
6. Pineapples, banana.	Pineapple not very digestible because of fibrous nature. Dried bananas arc ground into a flour, and also used as a coffee.
7. Nuts.	

The composition of edible part of fruits is given in the following table. The carbohydrates include sugar and cellulose and vegetable gums. As a general rule, it may be taken that about 60 per cent. of the total carbohydrates consists of fruit sugar or levulose.

	Water.	Protein.	Carbo-hydrates.	Cellu-lose.	Acids.
Apples	82.5	0.4	12.5	2.7	1.0
Apricots	85.0	1.1	12.4	...	1.0
Bananas	74.0	1.5	22.9	0.2	...
Blackberries	88.9	0.9	2.3	5.2	...
Cherries	84.0	0.8	10.0	3.8	1.0
Cranberries	86.5	0.5	3.9	6.2	2.0
Currants	85.0	0.4	7.9	4.6	1.4
Figs, dried	20.0	5.5	62.8	7.3	1.2
Gooseberries	86.0	0.4	8.9	2.7	2.5
Grapes	79.0	1.0	15.5	2.5	0.5
Lemons	89.3	1.0	8.3	...	...
Nectarines	82.9	0.6	15.9	...	...
Oranges	86.7	0.9	8.7	1.5	1.0
Peaches	88.8	0.5	5.8	3.4	0.7
Pears	83.9	0.4	11.5	3.1	0.1
Pineapples	89.3	0.4	9.7	...	...
Plums	78.4	1.0	14.8	4.3	1.0
Prunes, dried ...	26.4	2.4	66.2	...	2.7
Raspberries	84.4	1.0	5.2	7.4	1.4
Strawberries	39.1	1.0	6.3	2.2	1.0

When to eat Fruit.—The laxative effects of fruit are best obtained if the fruit be taken alone the first thing in the morning on an empty stomach, half an hour before breakfast, with a little water.

The Uses of Fruit are as follows :—1. To supply nourishment. The greatest amount is contained in the banana, date, fig, prune, and grape, this being due to the large amount of sugar which they contain.

2. They are *thirst quenchers*, and supply water, the most watery fruits being melons, oranges, lemons, limes, and grapes.

They possess well-marked *antiscorbutic properties*, especially those which have an abundant supply of potash salts as well as lime and magnesia—for example, apples, lemons, limes, and oranges.

Their *laxative action* is due to the cellulose and seed, and to the special influence of their organic ingredients; the best fruits for constipation are fresh apples, figs, oranges, grape-fruit, prunes, and peaches.

Their *digestibility* depends on the fruit, its ripeness, freshness, and the personal idiosyncrasy of the consumer. The most easily digested are grapes, oranges, grape-fruit, lemons, cooked apples, figs, peaches. Somewhat less digestible are water-melons, prunes, pears, apricots, bananas, raspberries, currants, pineapples. The best for invalids are the juice of lemons, oranges, baked apples, pulped stewed prunes, grapes, and pineapple juice.

Preserving and Cooking of Fruits.—This is most commonly done by drying, or by making jam, just before they are fully ripe. Dried fruits are more nourishing, but are less digestible. Of these mention may be made of currants and citrons; figs, prunes, raisins, sultanas, and dates contain much nourishment; all are preserved in their own sugar (glucose).

Evaporated apples, pears, peaches are preserved by the evaporation of the excess of water which they contain.

Fruits are made into jams and jellies.

Fruit syrups are made with about half as much sugar as fruit juice.

Fruit soups are common in Germany, and are prescribed in fevers when there is no diarrhœa (p. 280).

When fruits are exposed to the sun and to considerable changes in temperature, they are liable to decompose, and undergo fermentative changes which make them injurious to

health. Insufficiently ripe or overripe, soft, decomposing fruits are certain to cause diarrhœa, colicky pains, cramp, and sometimes nausea and vomiting. Gastritis may be induced in young people by indulgence in unripe apples, pears, cherries.

Nuts.

Nuts contain a large quantity of fat, protein, some starch, and very little water. The shell forms on the average about half the nut. Nuts are not easily digested, owing to the dense cellulose framework which surrounds the kernel of the nut. They can, however, be bought prepared (cleaned), and can be ground down; in both cases this renders them more easily digestible. Proteid nuts, prepared by Christian, are an excellent sample of a highly nutritious and easily digested food. Most of the nuts are eaten raw, but chestnuts and cocoanuts, almonds and walnuts, are used also in confectionery. (For some specially prepared nut preparations and butters, see p. 241.)

The composition of the common nuts is given in the following table. Their very high proportion of fat and proteins makes them a very valuable food-stuff if carefully employed.

COMPOSITION OF NUTS.

	Refuse.	Edible Portion.	Comparative Value of Edible Portion.				
			Water.	Protein.	Fat.	Carbohydrates.	Ash.
Almonds..	64.8	35.2	4.8	21.0	54.9	17.3	2.0
Brazil nuts	49.6	50.4	5.3	17.0	66.8	7.0	3.9
Filberts	52.1	47.9	3.7	15.6	65.3	13.0	2.4
Hickory nuts ..	62.2	37.8	3.7	15.4	67.4	11.4	2.1
Pecan nuts	53.2	46.8	3.0	11.0	71.2	13.3	1.5
Chestnuts	16.0	84.0	45.0	6.2	5.4	42.1	1.3
Walnuts, English	58.0	42.0	2.8	16.7	64.4	14.8	1.3

Almonds (sweet and bitter) contain a large amount of fat and protein, but no starch and very little sugar. The small proportion of sugar makes them of great use in the treatment of diabetes. They are ground and made into almond cakes and biscuits. Salted almonds are eaten with dinner as an aid to digestion. Macaroons are a pleasant form of cake, composed of almonds and sugar. The bitter almonds contain hydrocyanic acid, and are only used medicinally.

Walnuts contain a large proportion of protein and fats; eaten freely between meals, they sometimes have a very laxative effect. They are usually eaten ripe and dry with dessert; the unripe food is made into walnut ketchup. The walnuts are taken before the shell has hardened; they are beaten to a pulp, and the juice is separated by straining; salt and vinegar are added, also spices, and after considerable boiling down the ketchup is bottled, and may be kept for years. The green walnut is used as a salad in France, mixed with onion, vinegar, salt, and pepper.

Chestnuts contain a small amount of oil and a large amount of carbohydrates. In Italy they form a valuable adjunct to the food supply. They may be boiled, roasted, or ground. When mixed with flavourings and maize meal they form polenta. Flat cakes are made from chestnut flour and water, and baked between flat stones. The meal may be used for soups, puddings, and as the basis of the stuffing of poultry.

Brazil nuts, *pecan nuts*, *beech nuts*, *hazel nuts*, *hickory nuts*, *pine kernels*, *filberts*, all contain much oil, and are imported in enormous quantities from Spain for the sake of their oil. Barcelona nuts are kiln-dried before export, and keep indefinitely; if hazel nuts—or their cultivated varieties, cobs and filberts—are not dried, they lose their flavour unless kept in air-tight vessels. Butter nuts easily become rancid after being shelled.

Cocoanuts are very indigestible even when thoroughly dessicated and grated. The nuts are eaten both ripe and unripe by the natives of the tropics, and the juice (cocoanut milk) is drawn out and drunk. They contain fully 70 per cent. of cocoanut oil or cocoa butter, which is used as a food or for lighting and lubricating purposes. The butter is suitable for cooking, and can be used instead of margarine. Acorns are used as food in some countries. They are used like chestnuts, and like them contain starch. They are described as a very good fruit, savoury to the taste and healthful to the body.

Pistachio, a nut native to Syria, has a green-coloured kernel; it is much used on account of this for confectionery and for ices.

Fungi.

Fungi are largely employed as food in Southern Europe. They are eaten raw. They are also dried or preserved by cooking in vinegar, brine, or olive oil, which takes away the characteristic acrid taste of some of them. They are fairly rich in nitrogenous matter, but experimental observations have shown that this is imperfectly absorbed. They also contain fat, sugar (mannite and dextrose), fungi acid, and an acrid ingredient. They are used in this country chiefly for their flavour, and also for pickling and making ketchup.

The chief edible fungus is the common mushroom, generally used for making savouries and ketchup. Care must be taken in gathering wild fungi that the poisonous varieties are not collected.

Lichens.—Iceland moss is a lichen. It contains from 70 to 80 per cent. of an indigestible starch (lichenin); its nutritive value is therefore of low order.

Algæ.—Irish or carrageen moss is a seaweed. It is specially noteworthy as supplying a pleasant drink, made by adding cold water in the proportion of half an ounce of carrageen to three pints of water, then boiling and straining. It may be flavoured by spices if desired. If more carrageen is employed, the result is a mucilage which yields a jelly on boiling, which may be used as a nutritious and pleasant article of food which is fairly easily digested.

ROOTS AND TUBERS.

The roots and tubers used for food comprise the potato, turnip, carrot, parsnip, artichoke, onion, with the different plants yielding arrowroot, tapioca, and sago. The main nourishment in these plants is stored up almost entirely in the form of carbohydrates, chiefly starch. They contain very little protein and fat, and are therefore vastly inferior in nutritive value to the cereals and pulses. Some of the

members of this group contain vegetable acid, chiefly combined with potash, and these salts give them their recognized antiscorbutic properties. A considerable amount of the salts, however, is usually lost in the process of cooking.

The *potato* is the most important member of this group. About 95 per cent. of the potato consists of water and starch, the rest of the solids being made of fibre, sugar, vegetable jelly, and pectin. It is very poor in nitrogen, and contains practically no fat. The richness of the potato in starch—about 20 per cent.—is its most marked characteristic, starch being largely extracted from potatoes for commercial purposes. In the process of cooking the albuminous juices are coagulated, the starch granules swell up and absorb the watery juices, and the potash assumes a mealy appearance. In this form it is easily digested. If the changes described do not take place, as happens with young potatoes, the potato has a more solid and waxy consistence, and in this form is much less digestible. As ordinarily cooked, some of the salts are lost, and to avoid this potatoes should be cooked in their jackets, or else steamed. The alkaline salts in potatoes make them specially useful in the treatment of scurvy.

The *sweet potato* is not used as an article of diet in this country, but is largely used in France, Spain, and the United States. It contains about 16 per cent. of starch and 10 per cent. of sugar. It is too sweet to eat with meat as a vegetable. It is a most wholesome article of diet.

The *yam* is a tuber of a tropical climbing plant. It contains much starch. When cooked it becomes mealy and like the potato in flavour.

Beetroot.—Beet contains from 80 to 90 per cent. of starch and sugar, and is one of the chief sources of cane sugar. Young beets are eaten boiled, and served with salad or eaten with vinegar.

The Turnip.—The nutritive value of the turnip is very small. It contains about 91 per cent. of water and 5 to 6 per cent. of carbohydrates, chiefly in the form of pectin bodies, and about 1 per cent. of nitrogenous substances. Turnips have a marked tendency to cause flatulence.

Carrots are more nutritious than turnips, having from 8 to 10 per cent. of carbohydrates, chiefly in the form of sugar. They are not readily digested nor easily absorbed.

Parsnips closely resemble carrots in composition. They are rich in starch and sugar, the latter being largely lost in the process of cooking.

Jerusalem artichoke is a tuber. Like turnips, it contains no starch, but is rich in carbohydrates, chiefly a variety of sugar belonging to the gummy series. It has a sweet taste, and remains watery after cooking. It is of no great importance as a food, but is of value for making good soups and sauces.

Onions are of value both as flavouring agents and as vegetables. They impart a strong typical odour to the breath, due to the presence of a pungent oil. The large Spanish onions are used as food. They have a moderate laxative action, due to their richness in cellulose.

Arrowroot is derived from the tuber of a West Indian plant (*Maranta arundinacea*). The roots are dried and pulverized to a fine starchy flour, which consists of practically pure starch, with from 15 to 20 per cent. of water. Its quality is judged by its whiteness, and by the ease with which there is made from it a firm, transparent, pleasant-tasting jelly, which remains firm and of good taste for three or four days. It is easily digested and very completely absorbed, and is therefore of special value in the treatment of diarrhœa and some gastro-intestinal derangements. In cases where there is difficulty in digesting starches or sugars, arrowroot is an unsuitable food. It is also used to thicken clear meat soups and extracts (see p. 382).

Tapioca.—Tapioca is also a pure starch, obtained from the tuber of *Manihot utilissima*, cultivated in South America. Its grains are small. It contains over 85 per cent. of starch. It is not quite so easily digested and absorbed as arrowroot. It is useful for adding to soups and for making into puddings with milk.

Sago is another starch obtained from the pith of the stems of several species of palm. In its composition and uses it is similar to tapioca.

STEMS AND LEAVES—GREEN VEGETABLES.

Green vegetables are even less nutritious than roots, and are chiefly valued for their mineral salts—especially salts of potassium—and as a source of ballast, their indigestible residue stimulating intestinal movements. These vegetables contain about 90 per cent. of water and only from 1½ to 3 per cent. of nitrogenous matter, probably only half of this consisting of protein (see table). In addition, they con-

tain cellulose in large amount, chlorophyll, sugars, gum, pectin, and sometimes traces of fat.

In health, vegetables (and especially green vegetables) should enter into the daily dietary, as their richness in alkaline salts makes them a useful food, and at the same times gives them valuable antiscorbutic properties. As has been indicated, their nutritive value is very low. Their relative indigestibility on account of the large amount of cellulose present, and the liability of the latter to undergo abnormal fermentation, restrict their value as a food for invalids.

COMPOSITION OF VEGETABLES.

	Edible Portion.				
	Water.	Protein.	Fat.	Carbo-hydrates.	Calories, per lb.
Cabbage	77.7	1.4	0.2	4.8	115
Celery	75.6	0.9	0.1	2.6	65
Cucumber	81.1	0.7	0.2	2.6	65
Lettuce	80.5	1.0	0.2	2.5	65
Onions	78.9	1.4	0.3	8.9	190
Rhubarb	56.6	0.4	0.4	2.2	60
Spinach	92.3	2.1	0.3	3.2	95
Squash	44.2	0.7	0.2	4.5	100
Tomatoes	94.3	0.9	0.4	3.9	100

The young vegetable has a bitter flavour, and is more digestible than an old one. As age advances they become tough and stringy from the increase in cellulose. They should be eaten fresh, for, owing to the large quantity of water which they hold, they soon dry when stored, and so lose their freshness. Celery and winter cabbage are exceptions, as they may be kept for weeks. Before use they should be carefully cleaned, not only by removal of dead and

decaying parts, but by careful washing and soaking in salt and water, the latter to kill any embryos of tape-worms, etc.

Vegetables as a whole are not very easily digested on account of the large amount of cellulose. In the process of cooking, vegetables gain much water and lose some of the carbohydrates and proteins, and much of their salts. As the nutritive value and digestibility of vegetables depend largely on their careful cooking—and special attention should be directed to this—a short account of the best methods of preparation is given later (p. 385).

Artichokes, Green.—A cultivated thistle. The heads are cut before they expand. They are eaten either boiled or raw with salt and pepper. The vegetable contains tannin, and is easily digested; but has a curious flavour, and is not in common use.

Asparagus is considered a great delicacy, and was even cultivated by the Romans. There are two varieties, white and green; the green is probably the finer. This vegetable possesses a very delicate flavour, and is much appreciated by invalids. The seeds are sometimes used on the Continent instead of coffee. The ingestion of asparagus has a diuretic effect, largely increasing the quantity and imparting a strong and disagreeable odour to the urine. It appears within one hour after it is eaten, and may persist from twelve to twenty hours. It is due to a sulphur product, which is formed in the intestine during digestion and is excreted by the urine.

Cabbages.—There are many varieties, but they all contain a large quantity of sulphur, which tends to cause flatulence; hence they are not suitable for invalids. When fresh and tender, cabbage is a wholesome food for the healthy, and has decided antiscorbutic properties. When young they can be eaten raw with vinegar. They may be used in broth, or boiled and made into a purée.

Cauliflower is the flower of a variety of cabbage grown large and tender by cultivation. It is one of the most easily-digested green vegetables. It is boiled and eaten with white sauce or cheese sauce; or, if shredded down and dressed with vinegar and oil, it can be added to salad, and it is also used as a pickle. Broccoli is a variety of cauliflower, but is inferior in flavour.

"*Greens*," or kale, have open heads of leaves. German greens are the most delicate. They should be boiled and mashed like cabbage.

Seakale are the tender young sprouts of the sea cabbage grown in the dark, so that there is no chlorophyll. The presence of the green colouring matter gives a disagreeable acrid taste. When properly cultivated they are as easy to digest as the cauliflower.

Brussels sprouts are clusters of leaves resembling miniature cabbages growing in the axils of the main leaves. They are very nice when thoroughly cooked.

Savoy is another variety of cabbage.

Sauerkraut, a German dish. The leaves of the white cabbage, when fully grown, are taken out, layers of salt laid between them and pressed. This bruises the leaves and squeezes out the juice; it is then set aside until fermentation commences. It is generally eaten boiled, like fresh cabbage.

Celery is much cultivated for the blanched leaf-stalks or for the root. It is eaten raw, alone or in salad. It may be cooked in milk and used as a vegetable, or used in the flavouring of soup. It can also be made into a purée and used as celery cream.

It is not easily digested, but its aromatic flavour makes it very popular. Celery salt and celery seeds are much used as flavourings. It has a great reputation for rheumatism; the reason for this is not quite clear.

Cucumbers are mainly eaten raw; they are generally used in salad. Immature young cucumbers are pickled as gherkins. Cucumber may be cooked and served in the same way as vegetable marrow, and is then easily digested.

Melon is more of a fruit, but it belongs also to the cucumber family. It is more a drink than a food, since the solids only amount to 5 per cent. The juice of the water-melon makes an agreeable cooling drink. Melons are eaten raw either with sugar or with ginger and pepper. The seeds of the Indian melon (kaukoor) contain a great deal of starch and vegetable fat; they are ground into meal.

Gourds.—Vegetable marrow is the best-known member of this group in the British Isles. The pumpkin is a large-sized variety, and so is the squash. Marrow is a succulent, wholesome vegetable with an agreeable flavour. It may be baked, boiled, or stuffed, or made into preserves. It is an easily digested vegetable.

Onion family are all nutritious, containing a quantity of nitrogenous material, also sugar, with a pungent oil rich in sulphur, to which they

owe their pungency and smell. The parts used are the bulb, young leaves, and seedlings.

Onions when scalded—that is, covered with boiling water and a pinch of salt—are not nearly so strong in flavour as unscalded ones. Boiling makes them much milder in taste than when raw. Onions are valuable as blood-purifiers. They are edible as fresh vegetables—for example, spring onions in salads—and after long keeping are useful as flavouring agents for salads, stews, soup, etc. There are a good many varieties.

The onion proper is of two sizes—the strong, small onion, largely used for flavouring, and the Spanish onion, much milder in flavour. Syboes are the young seedlings, and are much esteemed for soups and stews. Shallot or eschalot is a delicate onion with a strong taste, but wanting the pungent smell of onion. Chives, a smaller variety, where the leaves and bulb are also both used.

All onions impart a strong typical odour to the breath. It appears in two or three hours, and may persist for twenty-four hours or more. This is due to a volatile substance absorbed by the blood from the digestive tract and excreted by the lungs.

Garlic belongs to the onion family, but instead of having a bulb it is composed of small bulbs known as "cloves." In Spain it forms part of every dish, and is very nutritious. Used as a condiment it is stimulant and tonic, and aids digestion. Garlic odour is due to oil of garlic, which is a sulphide of allyl, found also in watercress and radishes.

Rhubarb is composed of the stems of the leaves, and is used more as a dessert, being eaten with sugar and cream. Its flavour is tart. Cooking renders it soft and easily digested. It tends to produce calcium oxalate in the urine when eaten to excess, and it is not good for gouty and rheumatic people.

Salad vegetables (lettuce, endive, cress, green peppers, mint, tarragon, parsley, chevril, borage, chive, horse radish, etc.). This is a group of vegetables, lettuce being the chief type, the leaves of which are eaten raw. These are not very easily digested; they are cooling, anti-scorbutic, nutritious, and gently laxative. They furnish a pleasant variety during a meal. They are usually eaten with oil and vinegar, or some other salad dressing. Some of these salad vegetables are used for pickles and relishes, as well as for salad. They stimulate the digestive secretions and give a fillip to the appetite.

Spinach is a favourite vegetable, but contains practically no nourishment. If the leaves are young and tender, and if they are cooked until they are quite soft and then rubbed through a sieve, it is a very easily

digested vegetable. "Beet tops," turnip tops, and dandelion leaves can all be used in the same way as spinach.

Tomato, although a fruit, is generally used as a vegetable. It is becoming very much appreciated. It may be eaten raw with green salad vegetables, or alone with pepper and salt; it can be baked, fried, stuffed, and used in innumerable ways. The skin should be avoided, the pulp only being eaten. As a flavouring agent, such as tomato sauce, tomato ketchup, tomato beans, an enormous amount of tomatoes are canned every year. They retain more of their original flavour than do most other vegetables treated in this way. *Egg plant* is allied to the tomato, but contains many seeds and is not so easily digested.

IV.

BEVERAGES AND STIMULANTS.

Chapter IV.

BEVERAGES AND STIMULANTS.

Water — Aerated Waters — Tea, Coffee, Cocoa — Alcohol.

WATER.

Water is indispensable to life. About two-thirds of the total body weight is composed of water, and water also enters largely into the composition of all food-stuffs. It is useful as a solvent, carrying nutrient material to the tissues and effete material to be eliminated by the kidneys and skin.

Daily Requirements.—On an average about four pints of water may be taken as the daily requirements of the tissues, of which about one-fourth is ordinarily taken in solid food. The best way of supplying water to the body is by drinking it in its pure state, when its useful solvent and eliminant properties can be fully utilized. The amount of water required daily in fluid form varies with the amount of loss by the excretory organs—skin, kidneys, and lungs; and this in turn depends to an important extent on the outside temperature, on the amount of muscular activity, and on the nature of the food. In hot weather there is a free diaphoresis, and more fluid is called for; whereas in cold weather the skin is less active, and less fluid is necessary.

Active muscular exercise promotes diaphoresis and diuresis, hence abundance of fluid is desirable. If the diet is a solid and dry one, and rich in nitrogen, more water is necessary in order to eliminate the extra amount of urea and other nitrogenous products; whereas, if vegetables and fresh fruit enter largely into the dietary, less water is required. Natural foods which are specially rich in water are milk and succulent fruits, such as grapes, oranges, melons, and plums; also vegetables, such as cucumbers, tomatoes, and salads. All vegetables contain more water than meats, and fresh fruits as a rule contain more water than vegetables.

Deficiency of Water a Common Dietetic Error.—One of the commonest dietetic errors is taking too little water. It is important to bear in mind that many patients are willing to take water in the form of a table water, who will not readily take it in the form of ordinary drinking water.

Drinking waters are spoken of as hard and soft, according to the proportion of mineral matters present in the water. Hard water contains excess of lime salts, the drinking of which may induce constipation, indigestion, and disturbance of the general health. By boiling the water its hardness, which is due to the presence of earthy carbonates, is diminished, as the carbonic acid, which assists in holding the carbonates in solution, is driven off. Boiling is also the most effective way of ridding the water of organic impurities. Boiled water when cooled has an insipid taste, but this may be largely got rid of by subsequent aeration in a gazogene, or by simply shaking up the water with air in a stoppered bottle.

As a general rule, it may be said that at least one and a half to two pints of pure water should be taken daily. This amount, it may be added, is considerably in excess of that taken by the average man. A useful method of prescribing

water is to give a full tumblerful of hot or cold water on an empty stomach—(*a*) the first thing in the morning; (*b*) an hour before the midday meal; and (*c*) the last thing at night.

Aerated and Mineral Waters.

Artificial aerated waters are made by charging water with carbonic acid gas at high pressure. The chief varieties of artificial aerated waters are as follows:—

1. Aerated distilled water—for example, salutaris water. Here all the mineral substances have been removed by distillation prior to being charged with gas.
2. Ordinary water impregnated with carbonic acid gas.
3. Alkaline waters, such as soda, potash, or lithia water. These contain on an average from five to ten grains of alkaline salt to the bottle.
4. Seltzer water, an imitation of the natural mineral water of Seltzer (in Nassau). This contains common salt, bicarbonate of soda, carbonate of magnesia, and hydrochloric acid.
5. Sweetened waters, such as lemonade, ginger beer, ginger ale, and the like. It is important to note that these are very acid drinks, and also rich in sugar. They should be avoided by gouty and rheumatic subjects.

Natural Mineral Waters.—Mineral waters are frequently taken as substitutes for ordinary water. They differ from ordinary water in the greater amount of gaseous and solid matters they contain. The gaseous constituents are mainly carbonic acid gas, and in much lesser degree sulphide of hydrogen; the solid constituents are salts of sodium, potassium, magnesium, aluminium, iron, iodine, bromine, chlorine, and sulphur. Some waters have a purgative action,

others a laxative, and others a diuretic effect, according to their composition. For ordinary table use a water must not contain more than 1 per cent. of mineral matter, otherwise the specific effect of the saline ingredients present may be obtained.

The natural mineral waters most largely used as table waters in this country are Apollinaris, Johannis, Seltzer, Kronthal, St. Galmier, and Vichy (Celestin). These are all alkaline, well-aerated waters, containing carbonate of lime and soda, and also sodium chloride.

TEA.

Tea is a preparation made from the leaves of the young shoots of an evergreen plant—*Thea*. It is grown chiefly in China, India, and Ceylon. The chief ingredients of tea are caffeine, tannin, and traces of volatile oils. The average composition of tea may be given as follows :—

Caffeine	2 to 4 per cent.
Tannic acid	10 to 12 ,,
Volatile oils	½ ,,

As a general rule, China teas have a delicate flavour, with little astringency; Indian teas have more body and astringency; Ceylon teas are also rich in caffeine, but not so strong as Indian teas. Most ordinary teas are blends.

Composition of an Infusion.—As caffeine is very soluble, all the caffeine present is dissolved at once on the addition of hot water. Tannin is much less soluble, the result being that prolonged boiling increases the amount of tannin present in the infusion. This is specially true of all the cheaper teas. In some high-class China teas, costing 5s. per pound, the proportion of tannin extracted may not be appreciably greater after ten or fifteen minutes' infusion.

On an average it may be said that a teacupful of tea, after a few minutes' infusion, contains about one grain of caffeine to rather more than two grains of tannic acid. Tea should be prepared with water that has just come to the boil, and is best after three to five minutes' infusion. If extracted too long it contains more than tannin, and a greater proportion of bitter principles. It is important that the water used should not be too hard or too soft. Excessive hardness may be neutralized by adding a pinch of soda to the teapot. A very soft water extracts more fully the bitter principle from the leaves.

Tea is not a food, but a pleasant beverage which has a stimulating effect on the nervous system. If made with boiling milk, it possesses nutritive properties. It should not be taken more than, at the most, twice daily, and always freshly made. It is specially important to avoid taking tea that has "stood" for some time. The habit of taking "meat teas" is a bad one, as the tannin in the tea interferes with the digestion of the meat. When taken to excess, tea deranges the digestive, the cardio-vascular, and the central nervous systems. Various symptoms of indigestion, excitability, sleeplessness, anæmia, constipation, and rapid, feeble pulse are the chief symptoms induced by excessive indulgence.

COFFEE.

Coffee is prepared from the seeds of *Caffea arabica*, the seeds being stripped of their covering and dried, and specially prepared by a roasting process, in which the berries lose about 20 per cent. of their weight by water, and about half the caffeine present in their composition. The roasting process sets free a volatile oil which imparts the characteristic aroma of coffee. After grinding, this volatile oil tends to

disappear, hence the importance of using freshly-ground coffee.

When coffee is made by infusion in the ordinary ways of this country, there is extracted about 20 per cent. To obtain the full strength of the coffee the example of the East should be followed, and the beverage prepared by infusion and decoction combined. When so prepared, coffee should yield fully one-third of its weight of extract. Like tea, coffee is not a food, except for the milk and sugar added to it. As ordinarily prepared, the amount of caffeine and tannin in a cup of coffee is very similar to that in a cup of tea. The most common adulterant is chicory (see p. 171), and many people prefer coffee with a chicory flavour. It differs from coffee in having very little caffeine, tannin, or volatile oil; and is much richer in sugar, having over 10 per cent. of sugar, whereas ground coffee has less than 1 per cent. There are now some wonderful substitutes used by vegetarians who object to the stimulating effects of the active principle of tea and coffee. These are prepared by roasting and grinding various cereals. They strongly resemble coffee in appearance and flavour, and are good beverages.

COCOA.

Cocoa is prepared from the seeds of *Theobroma cacao*, deprived of their outer pulp and roasted, in which form, as in the coffee bean, the starch of the seed is changed into dextrin. The peculiar aroma is due to a volatile oil. The striking feature in its composition is the high percentage of fat. It is also rich in starch and albuminous matter. The cocoa when roasted and broken into bits is known as "cocoa nibs." A pleasant drink can be made by boiling the nibs in water for several hours, and straining. This can

often be taken by patients who cannot take ordinary commercial cocoa. In many commercial cocoas there is a large addition of sugar and starch. If starch is added, the cocoa must be prepared for use by boiling for a few minutes; but if sugar is added to the cocoa, the cocoa only requires the addition of boiling water or milk. By reason of its richness it is not a suitable drink for people with weakened digestion. Peptonized cocoas are excellent nourishing drinks. Savory and Moore and Allenbury supply good brands.

Chocolate is cocoa to which have been added starch, sugar, and flavouring substances, generally vanilla. It contains about 1.5 of theobromine, 15 per cent. of fat, about 60 per cent. of sugar, and 5 per cent. of nitrogenous substances.

ALCOHOL.

The desire for a stimulant of some kind other than that of food is practically universal. There are no civilized and few uncivilized or semi-civilized people, with the exception of Mohammedans, Buddhists, and Northern Eskimos, who do not practise the distillation of alcohol in some form or other from the materials most available. Thus in Lombardy alcohol is made from potatoes, and in Japan from rice. The preliminary excitation of the central nervous system induced by alcohol is followed by a diminished excitability, which renders the person under its influence less conscious of unpleasant conditions affecting either his body or mind, and imparts a sensation of general well being and comfort that is the foundation for the long-established use of alcohol as a beverage.

It will be convenient to consider the subject in the following order: (*a*) the general effects of alcohol; (*b*) the nature and source of alcohol, and the composition of

different alcoholic beverages; and (*c*) hints regarding the use of alcohol in health and disease.

General Effects.—Alcohol is a general stimulant, small doses exciting, larger doses paralyzing the nervous system, beginning with the higher centres; it also stimulates the heart and blood-vessels, accelerating the circulation, but not notably increasing the force of the heart. In large doses the blood-vessels are paralyzed, thus becoming dilated, resulting in a fall of the body temperature.

When taken in moderate amount, alcohol is completely oxidized—that is, burnt up in the tissues; when taken in larger amounts, it escapes unoxidized with the breath and urine. Liebig, the renowned chemist, states that nine quarts of the best ale contain as much nourishment as would lie on the end of a table-knife. We must, therefore, conclude that, when judged by the requisite standards, alcohol cannot be regarded as a food. It may be true that in very acute illness a patient may live for some days on nothing but large quantities of whisky, brandy, or champagne, and may apparently not emaciate in that time as much as he would have done if he had been living merely on his own tissues; but even if this be so, it does not justify us in regarding alcohol as in any real sense a food.

A further effect of alcohol has to be noted—namely, alcohol as a cause of deficient oxidation of tissue. In virtue of its affinity for oxygen, it interferes with the process of oxidation in the tissues, and so leads to fatty degeneration and infiltration of the tissues. Hence the obesity observed in many subjects who take alcohol to excess.

Nature, Source, and Varieties.—Alcohol is obtained from fermentation of grape-sugar by means of yeast. The source of the grape-sugar is grain, especially barley, grapes, and in some instances potatoes—the different kinds of alcoholic

liquors obtained depending to some extent on the particular kind of sugar, and also the special yeast employed. The various by-products in the process of fermentation also materially influence the nature of the product. The strength of alcoholic liquors is usually expressed as the percentage of alcohol by volume, the percentage of alcohol by volume in some of the commoner alcoholic beverages being roughly as follows :—

Whisky, Brandy, Rum	43 per cent.
Gin	35 ,,
Port	25 ,,
Sherry	21 ,,
Champagne	10–15 ,,
Hock	10 ,,
Claret	9 ,,
Bottled beer	7 ,,
Lager	4 ,,

We have to consider shortly the three different classes of alcoholic beverages—spirits, malt liquors, and wines.

Spirits.—Spirits are obtained by distillation of the products of fermentation of different saccharine (sugary) substances, the alcohol and various volatile substances being separated by distillation. Distillation of malted barley furnishes whisky, malted grape yields brandy, and malted molasses give rum as a distillation product, the flavour in each instance being due to the by-products of fermentation. The by-products can be entirely removed by means of patent stills, leaving an almost pure spirit known as silent spirit, so called because its source cannot be traced. Amongst the by-products of fermentation there are alcohols in a higher series, a mixture of which is known as fusel oil (amyl alcohol). Fusel oil is the last product of distillation, and is formed especially when spirit is made from grain or potatoes instead of malt. It should be noted that all spirits are free of sugar, and all have a very low degree of acidity.

Whisky.—Whisky is a spirit made from malt, or malt and grain It is of two kinds—malt whisky, made in pot stills, and grain whisky, made in patent stills, ordinary whisky being usually a blend of the two. In the case of malt whisky the by-products of distillation give the whisky a raw and disagreeable taste ; this, however, gradually mellows, the percentage of alcohol diminishing by 5 to 8 per cent. in the course of a few years. Irish malt whisky differs from Scotch whisky in being prepared from a mixture of malted barley with unmalted grain, the malt not being dried over peat, as in the manufacture of Scotch whisky.

Grain whisky is made from a mixture of grains—barley, rye, and maize—with a little malt to convert the starch into sugar. It is distilled in patent stills in order to separate to a large extent the by-products of fermentation, including fusel oil. Its method of manufacture makes it soon ready for use, and, unlike malt whisky, it does not improve on keeping. Most commercial whiskies are blends of malt and grain whisky. In recent years the introduction of patent stills and the extended scale of manufacture have led to an increase in the amount of potato and grain spirit, and it is in these spirits, made from unaltered starch, that fusel oil is specially found. The legal limit for dilution of whisky is 42.7 alcohol by volume.

Brandy.—Genuine brandy is a product of the grape, and is prepared from the distillation of wine. Good brandy improves on keeping, due to the formation of the volatile ethers. Most commercial brandies, however, are not genuine brandies, but are made from silent spirit, the product of potato or grain coloured with burnt sugar, and flavoured by special essences in imitation of genuine brandy. The alcoholic strength of brandy and whisky are the same—namely, 43 per cent. Good malt whisky is more likely to be pure than brandy, and it has the advantage of being much cheaper.

Rum is the product of distillation of fermented molasses obtained in the manufacture of raw sugar, the by-products of fermentation giving rum its characteristic flavour. The best varieties are made from fermentation of the juice of sugar cane. Much of the commercial rum is made, as in the case of brandy, from silent spirit flavoured with special essences, the colour being imparted to it by the addition of burnt sugar. The alcoholic strength of rum is rather greater than that of whisky—from 50 to 60 per cent. by volume.

Gin is a product of fermentation of a mash of rye and malt, and distillation of the product; juniper berries, a little salt, and occasionally hops being added in the final distillation. Genuine gin is made in

Holland. Much of the commercial gin is made, as in the case of brandy and rum, from silent spirit, flavoured with juniper berries, salt, turpentine, etc. The legal strength of gin is 37 per cent. by volume, the usual strength being about 50 per cent. A sweetened and diluted gin goes by the name of "Old Tom." Unlike other spirits, it is not coloured by the presence of oil of juniper or similar oils, which cause a milkiness when diluted with water, since they are insoluble in water. The oil of juniper gives gin distinct diuretic properties, the excretion of urine being notably increased.

Liqueurs are liquid spirits which essentially consist of very strong spirits sweetened with cane sugar, flavoured with aromatic or other herbs or essences, and often brightly coloured by vegetable colouring agents. The proportion of alcohol in them is high, ranging from 35 to over 55 per cent.; they are usually rich in sugar, such liqueurs as Chartreuse, Kümmel, Anisette, and Benedictine containing about 30 per cent. of cane sugar. Absinthe is a yellowish-green liquid containing a poisonous oil which has a deleterious effect on the nervous system. It contains about 50 per cent. of alcohol, and from 1 to 2 per cent. of sugar.

Malt Liquors.—*Beer* is the product of fermentation of malt (barley) with hops. In the preparation of most commercial beers, however, cheaper substitutes for malt are employed. These include potatoes, maize, and rice. The yeast fungus lives upon sugar, converting ordinary sugar into fermentable sugar, and then decomposing part of the latter into alcohol, giving off carbonic acid gas in the process. Only a part of the sugar originally present in the solution is converted into alcohol, since the yeast plant is killed where the proportion of alcohol rises above a certain point. The quality of beer depends largely on the temperature at which the "mashing" is carried out—the higher the temperature the greater the proportion of malt sugar in the beer; also on the temperature at which the fermentative process is conducted. As this is usually high, most of the sugar is broken up, and beer is, therefore, fairly rich in alcohol. In Germany the fermentation is carried out at a lower temperature, with the result that German beers contain less alcohol and more carbonic acid. A light beer is one which contains more malt and less hops, and in its preparation the malt is dried at a higher temperature. Some beers—for example, India pale ale—are very thoroughly fermented, and therefore contain very little sugar. The essential substances in beer are four in number—alcohols, sugars, free acids, and bitters. The proportion of alcohol varies from about 2

to 7 or 8 per cent., the latter strength being that of some stronger British beers—for example, Bass's and M'Ewan's. If beer or other alcoholic liquors produced by fermentation are exposed to the air, further oxidation takes place, part of the alcohol being changed into acetic acid under the influence of the acetic acid bacillus.

Stout and *porter* are made in the same way as beer, but the malt is first subjected to a roasting process, which induces the formation of caramel, to which the colour is due. Caramel is added artificially in the preparation of many commercial liquors. Porter is a mixture of dubious composition, containing often liquorice, treacle, linseed, etc.

On an average, it may be taken that the chief ingredients of a pint (20 ounces) of good bottled beer are as follows :—

Alcohol ...	1 fluid ounce.	Free acids ...	25 grains.
Extract ...	1 to 2 ounces.	Salts	13 ,,

Common salt is sometimes added to beer to induce thirst, and sugar to increase the head of beer and give an appearance of fuller body.

WINE.

Wine is (or should be) the product of the juice of the grape by fermentation. When so prepared it is an alcoholic solution varying in strength from 6 to 25 volumes per cent., and containing flavouring and other substances. The chief chemical constituents of the juice are sugar, for fermentation of alcohol; organic acids or their salts, chiefly of tartaric, citric, or malic acid; and albuminous substances. The stones or seeds furnish essential oils, which are largely responsible for the bouquet of wines, and the skins and stones furnish pigment and tannin. The quality of wine depends on the amount of sugar and albumin in the juice. In the process of fermentation the yeast germs split up the sugar, with the formation of alcohol. If there are a small amount of the sugar and a large amount of albumin in the juice, fermentation goes on till all the sugar is split up. This furnishes a dry wine with a slightly acid taste—for example, hock. If, on the other hand, there is a large

amount of sugar and a much smaller amount of albumin, the fermentation is less complete; some sugar is left in the wine, as in "sweet wines." When, as a result of fermentation, the proportion of alcohol has risen to 15 per cent. by volume, the process of fermentation is arrested by the alcohol; hence a natural wine never contains more than 15 per cent. alcohol. Wines are often fortified by the addition of spirit. This has the twofold effect of adding to their strength and preserving them from further fermentation, and so preventing the production of the acetic and other acids which make the wine sour.

The natural salts in the juice of the grape consist largely of cream of tartar, which is often deposited as a crust in bottles and casks. The presence of lime in wines is largely due to the process of "plastering." A natural wine is muddy in colour, and in order to improve the appearance, making it transparent, plaster of Paris (sulphate of lime) is added. This has the effect of removing the impurities; at the same time some sulphate of lime is left, and this is an insoluble salt, and its presence is partly responsible for the gout-producing properties of some wines. Good wines improve on keeping: the tannin is deposited, leaving the wine light in colour; the proportion of sugar diminishes, making the wine less sweet; the volatile ethers increase at the expense of the tartaric acid, so that the wine becomes less acid. Wine that has been long in bottle becomes "corked," due to the action of a mould which penetrates from without.

Many of the cheap wines imported into this country are artificial, being made from cider and ordinary potato and grain spirit, flavoured with œnanthic ether, and coloured by aniline dyes or by vegetable extracts such as madder, beetroot, or logwood.

For the detection of these impurities, elaborate schemes are given in analytical works.

Red Wines.—Dark grapes are used in the making of red wines, the skins and stones being left to ferment with the pulp, to which they yield tannin, pigment, and extractives. The average composition of red wines may be taken as follows :—

Alcohol	8 to 11	per cent.
Acids	0.5 to 0.65	,,
Sugar	0.5	,,
Tannin and pigment ...	0.1 to 0.2	,,

White Wines are usually made from white grapes. They are produced in great variety, and they have, as a rule, a rather higher percentage of alcohol than red wines.

General Composition of Wines.—The important ingredients in wines are the following :—

Alcohol,	Sugars,
Acids,	Ethers.

Alcohol in Wine.—The amount of alcohol (ethylic) present in wines ranges from 8 to 11 per cent., or more in fortified wines—for example, port. All natural wines are comparatively poor in alcohol, and thus readily undergo the acetic fermentation, and so becoming sour. A fortified wine, therefore, keeps better, subsequent fermentation being restrained. Amyl alcohol and other higher alcohols are present in traces even in sound wines. As is invariably the case when alcohol is formed by fermentation, carbonic acid gas is given off, and if a wine is bottled when this action is all over, the product is a "still wine;" if, on the other hand, the wine is bottled, like beer, before the fermentation is quite over, then the liquor becomes charged with carbonic acid gas, which effervesces or liberates, producing a "sparkling" wine. Sparkling wine may also be made on the principle of aerated waters, by passing carbon dioxide into the wine under pressure.

Acids in Wine.—In a good wine the total acidity should be not more than .3 to .7 per cent. The taste of a wine cannot be regarded as a criterion of its acidity, as the acids may be masked by a high proportion of sugar. The acidity is due to natural acids and acids produced by fermentation. The natural acids in wine are tartaric, tannic, and malic acid. Tartaric acid exists in combination with potassium in the form of potassium bitartrate. As the proportion of alcohol in wine increases with age, the bitartrate becomes less soluble, and settles out in the form of "tartar." The tannic acid in wine is responsible for the astringent taste of certain wines.

Acetic, formic, succinic, and other fatty acids are produced in wines by fermentation. Red wines usually contain rather more of these volatile acids than white wines. If present in excess, the wine is slightly "turned"—that is, on its way to become vinegar.

According to Dupré, the amount of acid, reckoned as tartaric, in a bottle of wine is as follows :—

Claret	... 65 to 77 grains.	Sherry	... 54 to 61 grains.
Hock	... 57 to 70 ,,	Port	... 49 to 62 ,,
Marsala ...	...	...	... 39 to 46 grains.

Sugar in Wine.—A natural wine should contain about ½ per cent. of sugar. Fortified wines may contain 2 per cent. or more, and sweet wines as much as 20 per cent. The following analysis is given by Dupré :—

Hock ...	... 1.4	to	8.6	grains	per bottle.
Claret ...	... 11	,,	18	,,	,,
Sherry	... 217	,,	421	,,	,,
Port ...	... 221	,,	519	,,	,,
Old Marsala	... 388	,,	451	,,	,,
Sauterne	... 125 grains per bottle.				
Champagne	... 500 grains down to almost none.				

Ethers in Wine.—The ethers present in wine impart to it its bouquet. The volatile ethers are derived from the volatile acids—for example, acetic acid; the fixed ethers are the product of the fixed acids—for example, tartaric acids.

As already stated, wines are divided into two great classes, natural wines and fortified wines. The chief *natural wines* are claret, hock, and the Hungarian, Italian, Australian, and Californian wines; the principal *fortified wines* being port, sherry, Marsala, Madeira, and, as a rule, champagne. A few short notes on these various wines are appended, attention being chiefly directed to the points of practical importance from the medical point of view—namely, the proportion of alcohol, sugar, and acid present in each.

Claret.—A natural wine containing from 8 to 13 per cent. of alcohol, about ¼ per cent. of sugar, and about ½ per cent. of acid.

Burgundy.—Similar to claret, rather higher percentage of alcohol as a rule, and richer in extractives, and has, therefore, more body. Chablis is a white Burgundy made from white grapes.

Hock.—Similar alcoholic strength to claret; only traces of sugar, and acidity about the same as claret; very small amount of acetic acid; good keeping qualities.

Hungarian Wines.—Two varieties—red and white; alcoholic strength as in claret; almost free of sugar.

Italian Wines.—Red and white; rather low percentage of alcohol and relatively high acidity.

Californian and Australian Wines.—Full-bodied natural wines; red and white variety.

Port.—A fortified wine, containing from 15 to 20 per cent. of alcohol; full of body, on account of large amount of extractives; relatively low acidity, but good deal of tannic acid, which diminishes with age. Rich in sugar (from 1 to 6 per cent.), giving a strong, dry wine or strong, sweet wine respectively.

Sherry.—The white wine of Spain. A fortified wine; percentage of alcohol similar to port. Amount of sugar varies very greatly; may contain mere traces or as much as 4 per cent., giving a strong, dry wine or strong, sweet wine respectively. Low acidity; improves greatly with age.

Madeira.—Similar to sherry; rich in volatile ethers. Dry and sweet varieties, as with port and sherry.

Marsala.—A Sicilian wine resembling sherry, but contains on an average more sugar; very slightly acid.

Champagne.—A fortified sparkling wine; may be dry or sweet. Sugar varies from nothing to 12 or 14 per cent. True dryness is the result of age, and is due to a very slow conversion of sugar into alcohol; in many commercial preparations the "dryness" is attained artificially, and really represents very varying degrees of acidity. Acidity, about ½ per cent.; alcohol, about 10 to 12 per cent.

Cider and Perry.—Made from apple and pear respectively; very mildly alcoholic, 2 to 8 per cent.; sugar, 2 to 6 per cent.; slightly acid, 1 to 6 per cent., chiefly malic acid. The more acid wines may contain as much as 20 grains of tartaric acid per tumblerful.

Medicated Wines.—There are several varieties of "medicated wines" in the market, such as "meat and malt wine," made from extract of meat, malt extract, and sherry or port; and "coca wine," made from coca leaves and sometimes cocaine. The use of these wines is to be strongly deprecated from every point of view.

So called *British Wines*—for example, ginger, currant wine, etc.—are not wines at all, but made-up drinks, coloured and flavoured with special essences.

THE USE OF ALCOHOL IN HEALTH AND DISEASE.

Healthy people do not need alcohol, and are probably better without it. When used in strict moderation, however, and on appropriate occasions it adds to the pleasures of life, and has no injurious effects on the tissues. But this raises the question, What constitutes a strictly moderate quantity of alcohol? What constitutes the maximum amount of alcohol that can be taken daily without injury? Is it, for example, one or two glasses of whisky or their equivalent? No very precise answer can be given to this question, because our sensations are not a safe guide, and the tissues of a man who feels perfectly well while taking what he thinks a strictly moderate daily allowance, may be all the time undergoing insidious

injury. The statements of insurance authorities show clearly that the mortality of total abstainers is considerably less than that of temperate drinkers; but this fact gives, of course, no indication of what constitutes the harmless maximum for the average individual. In arriving at a decision regarding the average amount of alcohol that may be taken by a healthy individual, consideration must be given to the following points:—

1. Alcohol acts more injuriously on the tissues of those leading a sedentary life.

2. The purity or otherwise of the whisky, wine, or beer is all-important, the injurious effects being proportionate to the degree of rawness and adulteration, which is considerable in many preparations.

3. The harmful effects of various alcoholic beverages sometimes depends on the sugar and acids present, and not on the alcohol.

4. The question of idiosyncrasy has to be considered: some people cannot take certain wines or other liquors without feeling the worse for it.

In defining the term strict moderation, it may be laid down that one glass of whisky, or a couple of glasses of port, or a pint of pale ale or their equivalent are the maximum daily allowance for a man in health. The habitual daily consumption of alcohol in any form is, however, a mistake. More harm to the individual results from the habitual indulgence in so-called moderation than by occasional indulgence in rather larger quantities.

Reference has already been made to the importance of drinking only good liquors. Raw and immature whisky, adulterated wines, and malt liquors of very doubtful quality are extensively sold, especially among the poorer classes, and are largely responsible for many of the injurious effects of alcohol.

A word may be added as to the proper time to take alcohol. There is no doubt that, if taken at all, alcoholic liquors should be taken with meals. The habit of drinking between meals is to be deprecated. Drinking in the early part of the day is a specially pernicious habit, and the man who has a desire for an early morning drink is in reality a dipsomaniac.

A remarkable change has occurred during the past twenty years in the attitude of the medical profession on the question of the value of alcohol in *the treatment of disease.* Whereas formerly wines and spirits were largely used in the treatment of many acute and chronic diseases, the present tendency is more and more to discard alcohol in the treatment of disease. This change in the custom of the profession is very well shown by a reference to the following figures. In the year 1890 the annual cost of wines and spirits per occupied bed in the Royal Infirmary of Edinburgh was 12s. 10½d.—10s. for spirits, and 2s. 10½d. for wines. In 1908 the annual cost was 1s. per head per annum for spirits, and nothing for wines.

While the use of alcohol in the treatment of disease is now very restricted, there is no question as to its undoubted value in the treatment of certain diseases, more especially in their critical stages.

There is little doubt that this restriction in the use of alcohol has not been attended with any disadvantageous results to such patients as would in former years have been freely "stimulated." On the contrary, there is reason to think that this alteration in the custom of the medical profession regarding the use of alcohol in disease has been a factor of some value in diminishing the number of those who ultimately fall a victim to its effects. We must, at the same time, recognize that alcohol is a very valuable thera-

peutic agent in the treatment of some diseased conditions. These call for detailed consideration.

In Acute Diseases.—In certain acute fevers, such as pneumonia, diphtheria, and the like, when the circulation is distinctly failing, as shown by a rapid, weak, and irregular pulse, the administration of alcohol in doses of 1 dram to 1 ounce every two or four hours, according to the age of the patient, is of great value. It should be noted, however, that the proportion of cases of pneumonia which call for its administration is a really small one. In the general run of cases occurring in healthy subjects of non-alcoholic habits there is no necessity to have recourse to stimulants. In exceptional cases, however, and in those who have been previously addicted to its use, the free use of stimulants is necessary. Diphtheria is such a treacherous condition, and the risks of establishing a habit from its use are here so remote, that it is advisable to have recourse to the use of stimulants if there is the least dissatisfaction with the general state of the patient or the condition of his circulation. It may be given in doses of 1 to 4 teaspoonfuls or thereby every two or four hours, according to indications. In weak elderly subjects suffering from bronchitis with congestion of the lungs, and in elderly subjects with chronic heart disease, a little whisky, brandy, or dry champagne is often of very great value as a stimulant. It may have at the same time a sedative effect on the nervous system, as it often tends to promote sleep.

In Chronic Diseases.—Alcohol is sometimes of considerable value in cases of failure of digestive power, as indicated by inability to take and enjoy food, as also in states of general weakness. Here it may be given in the form of a little whisky ($\frac{1}{2}$ oz.), twice or three times a day with meals; or as a glass of dry champagne or other sound wine,

given with luncheon and dinner. Great care is, however, necessary in prescribing alcohol in these cases, more especially in the case of female patients suffering from general nervous exhaustion, as these are so prone to become permanently addicted to its use. The use of all medicated wines, elixirs, and the like cannot be too strongly deprecated. A glass of beer or stout given with one meal daily for a time is occasionally of distinct value, acting as a bitter tonic, and at the same time supplying a relatively large amount of nutriment in a fluid form.

V.

CONCERNING MEALS.

Introduction.
Breakfast.
Luncheon.
Afternoon Teas.
Dinner.
Meat Teas.

Chapter V.

CONCERNING MEALS.

THE number and nature of the meals partaken of by the average man are very much a matter of habit. Customs differ considerably in different races and also among different classes of society. The system common in France and other Continental countries may be described as a two-meal régime, the Continental breakfast being an extremely light repast and scarcely ranking as a meal according to British standards. In this country three meals a day may be regarded as the recognized custom. The different systems in vogue may be shortly represented as follows :—

FRENCH.

Breakfast.—A cup of coffee with one or two small rolls and butter.

Déjeuner.—A substantial meal about midday.

Dinner.—A good dinner in the evening.

BRITISH.

In this country the custom varies with the social circumstances of the individual. The two chief systems are the following :—

1. Breakfast ; luncheon ; tea (afternoon tea) ; dinner.
2. Breakfast ; dinner ; tea (a light tea, or a "meat tea"); supper.

We shall have more to say presently with regard to the question of tea, but in the meantime it may safely be affirmed that, under ordinary circumstances, the above represents the maximum number of meals of any kind that should be taken in the twenty-four hours by healthy individuals. As a matter of fact, those who limit their meals strictly to three well-selected meals are acting in the wisest way.

The habit of taking "early tea," on waking, is not to be commended, although this is permissible and often advisable in the case of elderly people. Another custom, which is only mentioned to be condemned, is that of taking a snack in the forenoon, between breakfast and lunch. This usually takes the form of tea or milk and bread or cakes. It is note-worthy that the people who are most prone to indulge in it are those who have least need of extra sustenance, as the habit is most frequently seen in those who have had a substantial breakfast, consisting largely of animal food—for example, ham and eggs.

A striking and useful lesson may be learned from a comparison of the immediate results observed in those who take a light breakfast as contrasted with those who take a large breakfast, including one or two courses of animal food. If, for example, a man engaged in sedentary occupation takes a breakfast containing a liberal supply of ham and eggs, or a rich "two course" hotel breakfast at 8.30 a.m., in nine cases out of ten he is hungry before twelve o'clock; whereas, if he takes a more frugal meal of porridge and cream or milk, with a cup of tea and slice of toast—a diet which, to a superficial observer, is much less "nourishing"—he is less hungry at one o'clock than he is an hour earlier on the stronger régime, and at the same time he feels generally lighter and fitter for his morning work on the less stimulating meal. The fact is that strong meat is stimulating, but the stimulus is

not necessarily a good one, as it begets the need for a fresh stimulant. Exactly the same thing holds good with regard to luncheon. The man engaged in sedentary occupation who takes a large two or three course luncheon, with much rich meat food, is more ready and anxious for the fresh stimulus of afternoon tea or other stimulant, three hours later, than the man who has taken a light lacto-vegetarian meal. Confirmatory evidence of this is afforded by the experience of the average Britisher who, for the first time abroad, makes a trial of the Continental breakfast. He is surprised to find that he feels fit and well all morning after a meal which is a mere shadow of the breakfast which he has been accustomed to take at home. All things considered, it may be affirmed that a *moderate breakfast*, a *light luncheon*, and a *good dinner* constitute the ideal system for the average man. Before considering these further, it is well to mention some general points which should be kept in mind, for example :—

1. The diet must be selected to agree with the "constitution" rather than with the stomach. This is of special importance in those predisposed to obesity, gout, etc.
2. Thorough mastication is all important; it is not only of great value as an aid to healthy digestion, but it diminishes the risk of indulgence to excess.
3. Fluids, except in the case of soups, should be taken at the end of a meal; the swilling down of food with fluid should be avoided.
4. Keep in view that light meals may not only be very palatable, but are usually more nourishing than rich, heavy meals.

A few words will now be directed to a consideration of the meals in detail, in the first place considering the meals under System 1, in which dinner is taken in the evening.

Breakfast.—No food or drink should be taken before breakfast, unless it be a tumblerful of hot or cold water the first thing in the morning, which is an excellent practice. For those engaged in sedentary work, a meal of porridge and cream or milk, followed by a cup of tea and toast, may be recommended as a light, nutritious, and ample meal. If preferred, another cereal may be substituted, such as barley meal, whole wheat meal, hominy, granose flakes, puffed rice, grape nuts. There are, however, many people with whom porridge or other cereal does not agree, and these may advantageously take a one-course dish of egg, fish, or bacon and egg, with tea, coffee, and toast or roll. On the other hand, if the man of sedentary occupation is going to the country for a day's golfing or shooting, he will be well advised not to be content with his usual plate of porridge, but should supplement it with an extra dish.

Luncheon.—The luncheon meal should certainly be a light one for all who are engaged in brain-work or are otherwise leading a sedentary life. Anything of the nature of a three-course meal, which is virtually a dinner, should be avoided. A light two-course meal is all that is required or is desirable, and this is specially true of subjects past middle life. It should be selected mainly from the lighter white-meat foods, such as fish, chicken, or game, with vegetables, a second course taking the form either of biscuit and cheese and cup of coffee, if desired, or a light pudding. An alternative luncheon, which may be commended, as highly suitable for many people leading an inactive life physically, is one composed solely of fruit, vegetables, bread and cheese, with a glass of milk or cup of coffee. Some appropriate recipes of this type of luncheon are given in ch. xxii.

Afternoon Teas.—Afternoon tea is, to a large number of people, an institution. Friends and acquaintances meet to

discuss each other over a hot muffin, some sweet cakes, and two or three cups of tea, often of doubtful freshness and temperature. As previously stated, three meals a day are enough for any one, and afternoon tea is not therefore necessary; but if the three meals are judiciously selected, a cup of freshly made good tea in the afternoon, with a wafer of bread or light cake, will do no harm, and it certainly makes an agreeable setting for an afternoon gossip. It becomes distinctly harmful from the dietetic point of view when it is made a meal of. Two or three cups of tea with scones and cakes in abundance constitute a meal, which is unnecessary and inadvisable for those who take a sensible luncheon in the middle of the day and dine in the evening.

Dinner.—If a man has planned his earlier meals along the lines laid down above, he will be ready for the chief meal of the day, and there is no reason, from the dietetic point of view, why it should not be a good one. A good family dinner is made up as follows :—

1. Soup.
2. Fish.
3. Joint or game.
4. Sweets.
5. Savoury.

One or more of these courses may be omitted according to taste, in which case a proportionately greater amount of the other courses may be taken. With regard to soups, attention has to be directed to the difference in the nutritive value of soups—for example, eight or ten ounces of a clear consommé constitute merely a stimulating liquid with practically no nutritive value, whereas the same amount of lentil soup or Scotch broth is a highly nourishing food.

Soup is taken as the first course at dinner, as it is, or

should be, a hot fluid. It stimulates the blood-vessels and glands of the stomach, and calls forth the gastric juices required for the digestion of the solid food to follow. Fish comes next, as it is, generally speaking, a light diet, and suitably introduces the stomach to the more arduous work of digesting the most substantial dish—the joint. After the chief nutritive supply has been provided, more delicate dishes, eaten in smaller quantities, are supplied. These are provided in the form of sweets and savoury. While the above may be set down as a sound régime for a good family dinner, it is advantageous to take occasionally a meal in which the meats are of the white variety only—for example, fish, poultry, game. This gives the digestive juices, and the tissues as a whole, a rest which is wholly beneficial to the individual.

Attention may now be directed to the system of meals largely in vogue in the industrial classes, in which the chief meal of the day is taken in the middle of the day. It is extraordinary to note the different systems of feeding which prevail. In my experience of hospital patients I frequently find men whose dietary includes rich animal food in the form of red meat, bacon, and sausages, at least four times daily. (Fish too seldom enters into this diet list.) The other side of the picture is also seen frequently in young women whose diet consists of four, five, or more meals a day, consisting largely of tea and bread foods, to the exclusion of good animal foods. Both extremes are bad, and inevitably lead those who adopt them into ill-health. The following régime may be recommended :—

Breakfast.—Porridge and milk, followed by a piece of fish or bacon, with bread or toast, and cup of tea or coffee.

Dinner should consist of two or three courses, either (1) soup, meat, and pudding; or (2) meat and pudding; or (3) a highly nutritious soup and pudding. Some highly

nutritious, cheap, and very palatable dinners, suitable for working people with limited means, are given in ch. xii.

Supper.—This may take one of the following forms: (1) Porridge or other cereal, if not taken at breakfast, followed, if desired, by a cup of coffee and bread; (2) a fish or egg dish, with bread and milk or coffee. Sausages may be included in the list of suitable dishes, as they frequently contain little meat, being largely composed of bread foods and other vegetable material.

The system of "meat teas" is only mentioned to be condemned. Tea and meat, more especially of the red variety, do not mix well, or perhaps it is more correct to say that they combine too well, the tannin in the tea combining with the rich albumin in the meat in a manner which seriously interferes with its digestibility. A fish or egg dish is less open to objection, especially if its digestion is not hampered by the inclusion of vegetables. Coffee or cocoa is a more suitable drink, on account of the smaller proportion of tannin present.

VI.

PATENT AND PROPRIETARY FOODS.

FOODS PREPARED FROM MEAT.

Meat Extracts.

Meat Juices.

Meat Powders.

FOODS MADE WITH EGGS.

FOODS MADE FROM VEGETABLE PROTEINS.

FOODS PREPARED FROM COW'S MILK.

CARBOHYDRATE FOODS.

Chapter VI.

PATENT AND PROPRIETARY FOODS.

Meat Foods—Egg Foods—Milk Foods—Starchy Foods

Patent foods are made, by processes of concentration, evaporation, and condensation, from meat, eggs, milk and milk products, cereals, vegetables, fruits, and nuts. In some, partial or complete predigestion of the natural food is carried out. A short account is here given of the leading facts in the composition and uses of the best-known proprietary foods. A full description of these is given in the author's larger work on "Food and Feeding."

FOODS PREPARED FROM MEAT.

These exist under the name of "meat teas," meat extracts, meat juices, peptones, peptonoids, dried meat powders, and lozenges. A large number of meat preparations do not contain the nutritive constituents of meat, or contain them only in very small proportions; on the other hand, they contain large amounts of extractives which may derange digestion and impair the action of the kidneys. When it is stated that 1 lb. of meat extract is equal to 34 lbs. of meat, it should be clearly understood that 1 lb. of the extract contains only the whole *flavouring matter* from the 34 lbs. of meat, and nothing more. These extractives have no nutritive value as tissue-builders or energy-producers, but have some value as stimulants of the

digestive secretions and for removing temporary muscular fatigue. Such preparations, therefore, as contain little or none of the nutritive constituents of meat are to be regarded as flavouring agents rather than as foods. If given in too large amount they may induce thirst, diarrhœa, and other evidences of deranged health. It will be convenient to discuss these preparations in the following order: (1) Meat teas and meat extracts; (2) meat juices; (3) meat powders and lozenges; (4) partially digested preparations.

Meat Teas and Meat Extracts.

A meat tea or meat extract is prepared by cutting up the meat into small pieces, heating slowly in water, then boiling quickly; the product is then strained, the protein (which is coagulated by heat and which forms a nutritive sediment) is thrown away, and the result is a fluid with an agreeable flavour, consisting of water, extractives, salts, and a very small amount of gelatine. One pound of lean beef extracted with one pint of water yields from 25 to 30 oz. of good beef-tea, which contains about 1½ per cent. of protein and extractives. Some commercial meat-teas are strengthened by the addition of some of the shredded-down meat fibres. Meat teas are often made from some of the proprietary meat extracts in place of fresh meat, and a meat tea so prepared compares very favourably with the home-made preparations, alike as to flavour, stimulating properties, and expense.

All beef-teas have little nutritive value, but are useful stimulants. They are, therefore, an expensive form of diet. In fevers and certain debilitating conditions associated with impaired digestion, poor appetite, and furred tongue, the patient can take a hot, clear, and slightly nutritive drink more readily than any other form of food. The rest given

to the digestive organs associated with the use of such a diet for twenty-four or forty-eight hours will be helpful in restoring the patient's capacity to digest and assimilate a really nutritious diet such as milk.

The better known of these preparations are as follows :—

MASON'S HOME-MADE BEEF-TEA.

Composition.

Meat fibre	3.74 per cent.
Soluble albuminoids and extractives	10.58 ,,
Mineral salts	2.37 ,,

The directions are: Dilute a tinful with a pint of water. This reduces the nutritive value to one-third, and brings it in strength to much the same proportion as in good home-made beef-tea. The cost works out at about 3½d. a pint. A comparison of the cost of this with that of other preparations may be given in tabular form :—

Lemco	1¼d. per pint.
Oxo	2d. ,,
Invalid bovril	2½d. ,,
Mason's beef-tea	3½d. ,,
Brand's beef-tea	4¼d. ,,

The cost of home-made beef-tea varies with the quality of beef used. One pound of meat yields 1½ pints, and the cost can be calculated from the quality of beef. On the whole, home-made beef-teas as ordinarily prepared are more expensive than those made from the above meat extracts.

Of the pure meat extracts, Liebig's is the most representative: 34 lbs. of pure beef yields 1 lb. of extract, which makes 70 pints of beef-tea, each pint containing the extractives from ½ lb. of meat. The composition of the extract is roughly as follows :—

Moisture	16 to 21 per cent.
Mineral salts	18 to 22 ,,
Extractives	56 to 60 ,,

It contains no protein and no fat. Numerous modifications of Liebig's process have been introduced since it was recognized that the fluid had practically no nutritive value. These modifications consist in the addition of meat fibre, so as to give the extract some definite nutritive value. These extracts have considerable value as stimulating and, in proportion to the protein present, as nutritive beverages. They can advantageously be used to add to other food-stuffs. The composition of the best-known meat extracts is given in the Appendix, p. 437. Good recipes for combining the meat extracts with soups, custard, eggs, etc., are given in ch. xxii.

Meat Juices.

Meat juices are quite different from the extracts. They consist of the fluid substance contained in the muscle fibre. They are prepared by extracting the juice by strong pressure and subsequently concentrating the product by evaporation *in vacuo.* Heat has to be avoided, as it coagulates the soluble proteins. The process is expensive, and the product is liable to decomposition. Glycerine, salt, or other preservative is added.

Home-made Fresh Meat Juice is cheaper and, on account of its freshness, more valuable than the proprietary preparations. The blood-red colour characteristic of many of the meat juices is repugnant to many patients. This difficulty can be overcome by serving in a red glass or cup. The preparation of home-made beef juice is given on p. 384.

Puro is extremely rich in protein, which is present in the form of egg albumin. It is a dark-brown fluid, becoming red on the addition of water. Its colour is repugnant to many patients, but the flavour is agreeable. However, if such a food is necessary, it is cheaper and just as efficacious to take the white of an egg (which contains approximately 12 per cent. of egg albumin); with this prepare albumin water (p. 53),

and add to it a few drops either of meat extract or home-made beef-tea. In this way a nourishing fluid rich in protein is prepared, at a much less cost than by the use of the proprietary preparations. (See Meat Extract Soup, pp. 410, 411.)

Bovinine is one of the cheapest meat-juice preparations. It contains a large proportion of protein. There is no doubt its nutritive value is high, but its flavour is not very agreeable. The amount of coagulable protein is much less in Brand's beef juice, Bovril Company's juices, Liquor carnis, and Wyeth's, though all may be regarded as uncooked juices.

Special mention may be made of Valentine's meat juice, which, according to Chittenden, contains only .55 per cent. proteins, and has therefore no more claim to being a nourishing meat juice than many of the beef extracts and soups.

Vincep is made of blood, boric acid, and a little alcohol, and contains 16 per cent. of protein ; the flavour is not agreeable. Alcoholic compounds of meat extracts should all be condemned, even if strengthened with malt or other carbohydrate food. These are apt to induce the alcoholic habit.

The composition of the beef juices is given in the Appendix (p. 437).

Dried Meat Powders.

These can be made at home by mincing cold boiled beef, drying it thoroughly in a slow oven, and grinding it up in a coffee or nut mill. In the preparation of a meat powder, nothing is removed except the water of the fresh meat and the tough, stringy, and indigestible portion rejected in sifting. One ounce of the powder is equivalent in nutritive value to four ounces of fresh lean meat. A meat powder may be utilized to increase the nutritive value of soup. The best examples are the following :—

Pemmican.—To every 50 parts of powdered meat 40 parts of fat are added, the resulting product being a food rich in both proteins and fat.

Mosquera beef meal is a preparation of high nutritive value. It contains 90 per cent. of nutritive material, 13 per cent. of this being fat. The meat is partially digested by the ferment of pineapple juice.

Meatox is a powdered beef which contains above 75 per cent. of nutritive matter.

Brand's nutrient powder consists of powdered muscle fibre from which the moisture has been removed at a temperature below the coagulation point of the muscle proteins ; it is readily digested and assimilated. Reference is later made to somatose, a similar preparation, in which the proteins are partly transferred into albumoses.

Marvis is a dried fish powder, consisting largely of proteins ; it can be used in the same way as other meat powders.

Meat lozenges, beef-tea tabloids, and all combinations of meat extracts with other food-stuffs are not to be commended. They are quite useless as a food, and are simply concentrated salts and extractives.

Ovo.—A powder made up in packets is sold as a substitute for eggs, each packet containing the equivalent of one egg. It is the egg dried, and on the application of water is redissolved. It is only to be used for cooking purposes if fresh eggs are not obtainable.

Egg and custard powders are also sold as substitutes for eggs. They consist chiefly of starch, baking soda, tartaric acid, and some vegetable dye, and have practically no nutritive value.

PROPRIETARY FOODS MADE WITH EGGS.

These exist usually as combinations with milk proteins, animal proteins, and fat ; the most useful are the following.

Virol, a valuable preparation made from marrow fat, yolk of egg, egg-shells, malt extract, and lemon juice, is a palatable preparation of considerable nutritive value. The maker's analysis gives the composition as 20 per cent. of fat and 60 per cent. of malt extract.

Virvis is a similar preparation of much the same composition.

Sanose is a powder consisting of about 80 per cent. casein and 20 per cent. of albumose, derived from white of egg.

Muffler's Food, sold by the Aylesbury Dairy Company, consists of desiccated milk, powdered white of egg, wheaten flour, and lactose.

Puro, a meat-juice preparation, contains much egg albumin.

The preparation by **Brand** termed Fever Food is most nutritious; it consists of essence of beef, eggs, and cream. In appearance it resembles custard, and has a very agreeable flavour, which is quite distinct from the meaty flavour of the beef juices and extracts.

PROPRIETARY FOODS MADE FROM VEGETABLE PROTEINS.

The chief vegetable proteins are :—

Aleuron, prcpared from the proteins of wheat—a white, tasteless, fairly soluble preparation ; also

Aleuronat, a yellowish-brown powder, almost insoluble in water. These are extremely rich in protein, fairly cheap, and are valuable in the feeding of diabetics.

Glidine, a concentrated protein food, is prepared wholly from wheat; it is free from carbohydrate, and is easily digested and assimilated.

Legumin, a vegetable casein, is made from pulses, and is a useful vegetable protein food.

Roborat is made from cereals; it is the most soluble of all the vegetable protein preparations.

Tropon and **Vegox** are two preparations of recent introduction in which the protein of vegctables is combined with the protein of animals, chiefly fish. They are used chiefly stirred up in thick soups and purées.

Emprote (Miles) is a concentrated vegetable protein manu-

factured from the proteins and salts of milk, wheat, and fruit. Further reference is made to proprietary vegetable preparations in the vegetarian section, under Nut Meats, and Nut Butters (p. 239).

Cow's Milk with Cereal Additions.

Mention must be made of some proprietary foods made from cow's milk to which have been added carbohydrates from cereals. There are three varieties :—

1. Foods with the starch practically unchanged.
2. Foods with the starch partly or entirely converted into soluble carbohydrates.
3. Foods partially predigested.

FOODS WITH THE STARCH PRACTICALLY UNCHANGED.

The chief ingredients of these foods are condensed milk, baked wheat flour, and sugar. These foods are rich in starch and sugar, and deficient in fat and proteins, and from their composition are unsuitable foods for infants. The chief varieties are Anglo-Swiss, American-Swiss, and Franco-Swiss foods.

	Water.	Protein.	Fat.	Carbohydrates.		Ash.	Remarks.
				Soluble.	Starch.		
Anglo-Swiss ..	6.5	10.26	4.91	46.4	29.4	2.02	Much cane sugar.
American-Swiss	5.6	10.54	5.81	45.3	30.0	1.2	" "
Franco-Swiss ..	4.4	13.0	3.70	46.0	30.8	1.4	" "
Muffler's Food ..	5.6	14.3	5.8	27.4	44.4	2.3	Contains powdered white of egg.

FOODS PREPARED FROM COW'S MILK.

These include *condensed milks* of different kinds, and various dried milk preparations which are described under "Milk" (p. 49).

CARBOHYDRATE FOODS.

Many of these foods are made from wheat flour or mixed flours, and consist of practically unchanged starch.

As examples, mention may be made of Albany food, Marr's food, Ridge's, Robinson's patent barley, Scott's oat flour, Hovis oats, Quaker oats, and other varieties. Sometimes the flour is baked, the heat converting a small amount of the carbohydrates into a soluble form. In other foods of the same kind a small amount of fat and a pulse food are added—for example, falona—consisting of baked cereals and a pea flour. Sugar may also be added, as in Frame food. The composition of these foods is given in the Appendix, p. 437.

VII.

PREDIGESTED FOODS.

The Action of Ferments.
Home Peptonizing.
Peptonized Soups, Blancmanges, and Jellies.
Predigested Milk Products.
Predigested Meats and Peptones.
Malt Extracts.
Malted Proprietary Foods.
Invalid Foods.

Chapter VII.

PREDIGESTED FOODS.

Ferments—Milk Foods—Malt Foods—Malt Extracts—Invalid Foods.

Predigested preparations are foods which have been partially digested by means of ferments. The development of many large commercial concerns for the manufacture and sale of predigested proprietary foods has been a striking feature in the past two decades. The various preparations may be classified as follows :—

1. Ferments for predigesting foods at home.
2. Predigested proprietary milk foods, either alone or in combination with starch.
3. Predigested proprietary meat preparations.
4. Malt and malt extracts.
5. Malted foods in which starch is partially changed or completely changed into soluble carbohydrates—"invalid foods."

The Action of Ferments.

There are three *ferments* employed to make predigested foods—(1) *pepsin*, prepared from the mucous membrane of the stomach; (2) a ferment, *pancreatin*, prepared from the

pancreas (stomach sweetbread); (3) a vegetable ferment, *diastase* or *malt*. Pepsin and pancreatin act upon the proteins of the food, these ferments possessing enormous energy, and being capable, even when only in very weak solution, of dissolving many thousand times their weight of food-stuff. Pepsin can only act in an acid medium; the pancreatic ferment, on the other hand, acts in neutral, alkaline, or feebly acid solution, and its action continues after the food leaves the stomach. For this reason practically all predigestion of foods is done with pancreatin, and when we speak of peptonized food we mean food that has been predigested by the pancreatic ferment. The ferments may be obtained as powders or as fluid preparations. Powders are preferable, being more constant in their action and less liable to impart their peculiar taste to the food.

The digestive ferments find their use in the following directions: (1) As *peptonizing agents* for the artificial digestion of food as described above; (2) as *therapeutic agents*, being used as remedies for indigestion—here the preparations are administered with or immediately after food. It is important to distinguish between the two different ways of using the ferments.

Peptonizing foods should only be employed when it is necessary to assist the digestive organs for a time by giving the alimentary canal some degree of physiological rest. This is indicated in many acute diseases associated with impairment of the gastric functions, such as gastric ulcer, cancer of the stomach, and some severe constitutional diseases in which irritability of the stomach is a prominent feature. Some details of the different preparations will now be given.

Pepsin in the form of pepsin powder or tablets, pepsencia (Fairchild's) or liquor pepticus (Benger's), is administered

after a meal, and is not mixed with the food before being swallowed, because, as already explained, to get it to act on the food the pepsin must be mixed with dilute hydrochloric acid, and this spoils the flavour of the food.

Savory and Moore have produced a saline essence of pancreatin and pepsin; this has an agreeable ketchup odour and flavour, and may be used with roast meat or fowl as a sauce, or a small quantity may be added to beef-tea, soup, or broth.

Home Peptonizing.—In actually peptonizing milk and foods by means of pancreatic ferments, there are several reliable preparations that may be employed. *Liquor pancreaticus* (Benger's, Allenbury's), *extractum pancreaticus*, and peptonizing powders, and Byne pancreatin are all reliable; the latter can be used either for peptonizing food or can be taken with meals. Fairchild's "zymine" powder and peptonizing tubes are also reliable. Savory and Moore manufacture peptonizing pellets, each weighing 5 grams. This form of powder does not require a large excess of alkali, and the flavour of the food-stuff is hardly altered.

All these peptonizing preparations give full directions for their use on their wrappings; in addition, the recipes for peptonized milk, gruel, soup, etc., given in ch. xxii., may be recommended.

Peptonized Soups, Blancmanges, and Jellies.—With a little ingenuity a variety of peptonized dishes can be obtained. There is no difficulty in doing this if it is always remembered that any peptonized fluid after standing at most two hours must be boiled, in order that the action of the ferment may be arrested. For the making of soups, use peptonized gruel instead of water; for the making of blancmanges, peptonized milk is added to the cream.

For jellies, mix the liquor pancreaticus with gelatine in

the proportion of two teaspoonfuls to the pint, allow it to stand for one and a half hours in a warm place, and then check the further action by boiling.

Predigested Milk Products.—Mention must be first made of Fairchild's peptogenic milk powder. By means of this powder the cow's milk is so modified as to conform remarkably to normal mother's milk, thus affording a food for infants exactly suited to the powers of infant digestion; the predigesting process can be gradually reduced until the infant can digest normal milk. Savory and Moore supply a number of concentrated peptonized milk preparations—namely, condensed peptonized milk, peptonized cocoa and milk, and a really excellent and highly nourishing preparation, café zylak, a peptonized coffee and milk (this, when diluted with hot water, makes a superior cup of *café au lait*); milk chocolate peptonized is a specially good sweetmeat for children; all are palatable and nutritious foods, which can be very readily prepared. Some of the milk companies prepare a predigested milk, and predigested varieties are sold under the name of Leeflund's peptonized milk and Backhaus's milk. These are not to be recommended, as there is no means of knowing how far the predigestion has been carried.

Milk in combination with cereals, with the starch partly or entirely converted into soluble carbohydrates. (The chief foods in this group are given in the table in the Appendix, *q.v.*, which gives also the composition.)

From the point of view of infant foods these foods have all the disadvantages of condensed milk, in respect of lack of freshness and deficiency of fat. The chief difference between these and condensed milk preparations is the form of the soluble carbohydrates in place of the cane sugar.

Predigested Meats and Peptones.—The advantages of having a meat nutriment which contains the albumins in a

soluble and readily assimilable form is obvious in the treatment of those patients in whom the digestive powers are more or less in abeyance, either in acute or chronic medical conditions or in some surgical emergencies. Predigested soups and meats can be prepared at home (see ch. xxii.); there are also many preparations in the market in which the proteins have been largely converted into albumins and peptones. These include various preparations of peptones, peptonoids, fluid meats, meat jellies, and meat powders. The strong meaty odour and the bitter taste of the peptones are an objection to their use to many patients. A further difficulty sometimes encountered is the occurrence of vomiting and diarrhœa induced by the albuminoids and peptones. The composition of the various preparations varies widely, the amount of protein albumins and peptones varying from 5 per cent. in Valentine's meat juice to over 70 per cent. in somatose. In some of the preparations—for example, Carnrick's—a large amount of carbohydrate is present, this being derived from wheat. The approximate composition of the chief peptone preparations is given in the table on p. 438.

Somatose is a meat preparation in which the albumin of the meat is mainly converted into albuminoids. It is a valuable preparation for increasing the nutritive value of other foods.

Savory and Moore's meat peptone is another useful concentrated form of nourishment. It possesses a full, meaty flavour. It may be used as soup or spread between bread and butter as sandwiches.

Benger's Peptonized Jellies.—These consist of meat and chicken respectively, boiled and digested by means of the ferment in the Liquor Pancreaticus, by which means almost all the flesh is converted into soluble bodies. The fluid is then made into a jelly by the use of gelatine. These jellies

can be used cold, or dissolved with hot water to form a soup.

Panopeptone is made from both meat and cereals, and claims to contain the nutritive principles of beef and bread. It may be used in several ways :—

1. Panopeptone with Whey.

   Place in a small teacup one or two teaspoonfuls of crushed ice, add one tablespoonful of panopeptone, stir, then fill the cup with whey. Drink slowly. (Refreshing and nourishing—an admirable liquid food for fever and convalescent patients.) The whey may be omitted.

2. Panopeptone.

   To a small teacup two-thirds full of boiling water add one tablespoonful of panopeptone and one teaspoonful fresh lemon juice, a little sugar, or flavour with salt and pepper or with celery salt. Drink immediately, sipping slowly. A light nourishing drink at night.

Malt Extracts: Diastase and Maltose.—Diastase or malt is a vegetable ferment which has the property of converting starch into the soluble sugar maltose. It is the action of this diastase which causes the ripening of fruits and vegetables by converting their starches into dextrins and sugars.

Farinaceous meal of any kind mixed with one-eighth of its weight of ground malt forms a highly digestible combination. These malted foods are in great demand for the feeding of invalids and children in any condition where the digestive power has been weakened—for example, convalescence from fever, tuberculosis, sepsis, neurasthenia, and disorders of digestion. Malt extracts can also be made and added to any ordinary farinaceous dish.

Malt extracts are malt infusions evaporated down *in vacuo* to a low temperature in order not to destroy the diastase ferment; this makes them expensive. The average percentage composition of malt extracts is as follows :—

Protein...	5 to 6	per cent.
Soluble starch ...	10 to 15	,,
Sugar	50 to 55	,,
Ash	1 to 2	,,
Water	22 to 34	,,

Malt extracts and malted foods in general are simply predigested starches, with other nutritive substances as above. As foods they are, however, deficient in fats and proteins. A useful combination would be a farinaceous meal of any kind mixed with one-eighth of its weight of ground malt. The chief proprietary extracts of malt are :—

1. *Kepler's malt extract* is a thick, treacly preparation, and can be given in teaspoonful doses after meals in milk or soda water, or it may be spread on any form of starchy food. This type of extract is a very good one to mix with cod-liver oil. It is rich in diastase.

2. *Hoff's malt extract* (or homax) is given as a wineglassful with meals. It is a liquid preparation not unlike beer, and to many people is more easily taken than the sticky preparation. It can be taken diluted with water, soda water, or milk. It contains considerable diastase, and not more than 10 per cent. alcohol. In the author's experience it is of special value in the treatment of some forms of indigestion in gouty subjects.

3. *Trommer's diastatic extract of malt*, made from barley malt, very syrupy in consistence, and sweet. A teaspoonful dose at first is enough to start with.

4. *Maltine* is made from three cereals—barley, wheat, and oats. It is rich in diastase. It is frequently given mixed with equal parts of wheat or barley flour, the mixture being used as a diluent of milk. It may be taken after meals, either plain or in various combinations, such as cod-liver oil, hypophosphates, etc.

Bynin, a fluid malt extract prepared by Allen and Hanbury.

In the *desiccated malt* extracts all the water has been removed—for example, Curtis's desiccated malt extract and gramalt. Cremalto is a mixture of Devonshire cream and malt, and is a good way of supplying easily digested fat.

Malt may also be made as an infusion at home, and can be prepared freshly; it is much cheaper than the preparations above mentioned. Recipes for making malt infusion and malted gruel will be found in the chapter on "Recipes," p. 397.

The malted proprietary foods in the market may only be partly converted into dextrins, maltose, and dextrose.

In some members of this group the starch is little altered; in others—Allenbury's No. 3, Hovis babies' No. 2, and Moseley's food—considerable conversion has taken place; and it is stated that some of them—for example, Coomb's malted food—are completely changed during the preparation, and therefore rank as completely malted foods. Mellin's food, Horlick's food, Hovis babies' food No. 1, are examples of completely malted foods.

Of foods which are completely malted or nearly so the best are Mellin's, Horlick's, Paget's malted farina, Chiltine maltose food, diastased farina, Hovis babies' food No. 1. The composition of these various malted foods is given in the Appendix.

Invalid Foods.—These are a group of foods of various composition that are of great use in the dietary of invalids.

Benger's food contains ferments which convert the proteins and starch during the preparation. It consists of cooked wheaten meal, to which is added the natural digestive ferment of the pancreas.

When mixed with warm milk, as recommended, the carbohydrates are nearly all converted into soluble dextrine and sugar, and the proteins are also partially peptonized. This is certainly one of the most useful proprietary foods on the market. It is specially useful in the feeding of weakly infants, and in cases of acute gastric intestinal derangements such as typhoid fever and malnutrition generally.

Benger's pancreatized lentil flour is specially prepared for children and invalids. Lentils form a highly nutritious food, being rich in nitrogenous matter, and the method of preparation of the flour makes it easy of digestion.

Savory and Moore's Best Food for Invalids.—The manufacture of this food was originally suggested by Liebig, but the process has since been much improved. The flour is specially prepared and then partially malted. On mixing in the manner described on the label of directions, the diastase converts the carbohydrates into soluble forms. It is very

digestible, and may be given in all cases in which a milk diet is indicated. Its pleasant malty flavour makes it a favourite food.

Savoro is another nutrient food prepared by Savory and Moore. The carbohydrates are partially malted and contain active diastase, assisting enfeebled digestive function. The milk and cereal proteins are not peptonized, so that the digestive apparatus has little work to perform.

'*Allenburys*' *diet No.* 3, like the above, is a farinaceous food which requires the addition of cow's milk. It is a partially digested food, composed chiefly of carefully cooked wheaten flour; to this is added malt in a soluble form. This food, though intended primarily for the use of infants after the fifth or sixth month, is of great value for invalid and convalescent diet.

Carnrick's soluble food is another preparation in this class. It consists of desiccated milk, malted wheat flour, and milk sugar. In the preparation the starch granules are partially digested, but much starch remains unchanged. This preparation is not so valuable as those mentioned above, as the latter have the advantage of being made with fresh milk.

By the use of the above-mentioned foods in combination with milk a variety of dishes can be made. The special directions for each food are detailed on the tins, and the directions should be closely followed. A number of useful receipts will be found in ch. xxii.

VIII.

FOOD PRESERVATIVES, FOOD ADULTERATION, AND DISEASES CAUSED BY FOOD.

FOOD PRESERVATIVES.

Dried Foods.
Smoked Food.
Salting.
Freezing and Refrigerating.
Treatment by Refrigeration.
Canning.
Preservatives.
General Effects of Preservatives on the Food.

FOOD ADULTERATION.

Milk.
Condensed Milk.
Cream.
Butter.
Cheese.
Lard.
Flour.
Bread.
Sugar.
Honey.
Treacle and Syrup.
Jams.
Mustard.
Pepper.
Spices.
Tea.
Coffee.
Cocoa.
Vinegar.
Lemon and Lime Juice.

DISEASES CAUSED BY FOOD.

Ptomaine Poisoning.
Poisoned Non-putrefying Meat.
Foods Containing Parasites or their Embryos.

Chapter VIII.

FOOD PRESERVATIVES, FOOD ADULTERATION, AND DISEASES CAUSED BY FOOD.

FOOD PRESERVATIVES.

A SHORT account is first given of the different methods of preservation of foods, and of their effects on the nutritive value of the food.

Dried Foods.—Milk, vegetables, and fruits are preserved in this way: the watery constituents of the food may be partially removed, as in the case of condensed milk, or completely removed, as in the desiccated form, the dried milk powder being used to increase the nutritive properties of other foods (see p. 49). Tea and coffee are examples of food-stuffs prepared in this way; so also are peas, beans, grapes (raisins), apples, prunes, and figs. Sugar or salt is frequently employed to aid the drying and to assist in preventing the decomposition of the food.

Smoked Food.—The process of smoking is applied to beef, fish, tongue, ham, and bacon. It consists in hanging the meat in a chamber, in which the air is saturated with wood smoke, the antiseptic substances derived from the combustion of the wood impregnating the outer layers of the meat

and so preserving the whole. This process is usually employed after salting. Meat so prepared is not so easily digested as fresh meat.

Salting.—The addition of salt to meat or fish absorbs the moisture, and dries and preserves the meat. In the process some of the extractives and salts of the meat may be removed. Food so prepared is rather less nutritious and digestible than fresh meats. Salted meat requires prolonged cooking.

Freezing and Refrigerating. *The Process of Freezing.*—The process of freezing consists in subjecting meat to a temperature of about 26° F. below zero, the meat when hard being transferred to a refrigerating chamber. Meat so prepared can be kept almost indefinitely. Frozen meat should be cooked when thawed, as decomposition sets in more readily than in the case of non-frozen meat. Frozen meat loses some of its nutritive value in cooking, this loss being greater than in the case of non-frozen meat; it also loses a little delicacy of flavour. These disadvantages, however, are more than outweighed by the diminished cost.

Treatment by Refrigeration.—Here the meat is not actually frozen, but is kept in chambers maintained at a temperature a few degrees above freezing point. The temperature is maintained by a draught of cold air. This process involves less alteration in the meat than freezing. In addition to meat, fish, eggs, fruits, and vegetables can be so treated.

Canning.—The decomposition of all foods is prevented or retarded by excluding air from the food. This is done by the process of *canning*, or by varnishing the food, or by covering it with a substance of an impermeable nature, such as melted fat. Canned foods are very extensively used at the present time. The food is first made sterile by heat, or by the use of chemicals—the latter method being often abused

in the hands of unscrupulous people. Canned foods are on the whole less digestible and also less tasty than fresh foods. It has also to be borne in mind that some people may have an idiosyncrasy to the preservative used. The possibility of the occurrence of copper, tin, lead, or zinc poisoning from the prolonged use of canned meats must be borne in mind, the ingredients in some foods having a solvent action on the cans, as a result of which toxic symptoms are set up.

Preservatives.—A large number of *antiseptic and preservative substances* are used with the object of preserving food. Many of these are innocuous—for example, sugar, oil, and vinegar; others are harmless in minute doses but injurious in the amounts that are occasionally present, such as salicylic acid, formalin, borax, and sulphuric acid.

General Effects of Preservatives on the Food.—Generally speaking, the effects of preservatives are to render the food a little less nutritious, probably by interfering with the normal action of the digestive ferments. In some cases the food is rendered less tasty, and its nutritive value thereby impaired.

FOOD ADULTERATION.

Food may be adulterated either by the fraudulent substitutes of cheaper foods, or by the addition of substances which have a deleterious action. The objects aimed at by the manufacturer who engages in this malpractice are: (1) to increase the bulk of the food; (2) to give an erroneous impression as to the strength of the food; and (3) to alter the appearance in a manner favourable to the manufacturer.

The process of food adulteration has called for legislative action, but the condition is not always easily detected by any analytical method. It has been shown experimentally that the addition of boric acid to the food in the proportion of

$\frac{1}{2}$ per cent. is not injurious to health; this would be equivalent to the consumption of about $7\frac{1}{2}$ grains of boric acid daily. In conditions where the excretory functions of the kidneys or bowels are defective, smaller amounts of salicylic acid, borax, formalin, and the like in the food would produce injurious results more readily than under normal conditions. The injurious results that may be induced are gastro-intestinal derangement, albuminuria, and an impairment in the general health.

A short account is here given of the more common adulterations of some of the principal food-stuffs:—

Milk.—The most commonly encountered adulteration is dilution with water. When the dilution is made with pure water it is a fraud, and when, as sometimes happens, the water is from an impure source, it is a crime. Milk is sometimes artificially coloured by the addition of minute quantities of colouring matter, a little special pigment being added to impart the yellow colour characteristic of good cream. A pinkish or reddish coloration of the milk may arise from the ingestion by the animals of food rich in pigment. Various preservatives are added to the milk, notably borax, boracic acid, formalin, salicylic acid, and these may be very prejudicial to the digestion of milk in the case of infants and delicate children. Mixtures of borax and boric acid are sold to farmers and dairymen under the trade names conservine, preservitas, and others. Formalin is used under the trade names of "lactic fluid," "steryl," etc. Milk after a preliminary dilution is sometimes fortified by the addition of flour, farina, whiting, tragacanth or magnesium carbonate; the addition of one or other of these substances gets rid of the thin appearance of diluted milk. Sugar is also added to diluted milk to raise its specific gravity to a satisfactory standard.

Condensed Milk is frequently adulterated by the removal of the fat from the original milk before concentration. Glucose is sometimes substituted for cane sugar as a preservative in condensed milk, and preservatives may be looked for in the same manner as in milk.

Cream is commonly adulterated by gelatine, more rarely by dextrin and starch added with a view of thickening the cream; colouring matters are frequently added as in the case of milk. The preservatives commonly added to milk should all be looked for.

Butter is frequently preserved by the addition of borax, boric acid, sulphites, and nitrates. An addition of 5 per cent. expressed as boric acid is allowed by law. Some butters contain a large amount of water. Cocoa-nut oil is also frequently used as an adulterant in butter fat.

Cheese is often adulterated by the incorporation of animal fat. Various colouring matters are also employed, but so long as these are not injurious, such addition is not regarded as adulteration.

Lard (animal fat) is commonly adulterated on a large scale by the admixture of beef stearin, either alone or with vegetable oils, specially cotton-seed oil, cocoa-nut oil, or maize oil.

Flour.—A large part of the flour made in this country is bleached artificially by passing nitrous oxide gas through it. The bleaching is done by special machinery, the gas being made by an electric discharge, and the term electrified air—a misleading term—is applied to the gas. There is good reason to believe that the nutritive value of flour treated in this way is below that of the natural product of the wheat. In America the bleaching of flour has been made illegal, and it is to be hoped that ere long the process will be made illegal in this country, except when the flour is certified as bleached. Legislation on the subject of the bleaching of

flour and the addition of so-called "flour improvers" is urgently called for at the present time.

Bread.—Alum is added to bad or slightly damaged flour by both the miller and the baker (Blyth). There is some difference of opinion on the question whether in the moderate doses in which alum is taken in pastry, or bread, or cakes, the flour of which has been mixed with alum or an alum baking powder, it has the slightest appreciable influence on health. As, however, the addition of alum to bread and bread-foods is interdicted by law, its use must be regarded as an adulteration.

Sugar is sometimes adulterated by the addition of starch sugar, chalk, sand, and various species of flour.

Honey, the saccharine matter collected and stored by bees, is not infrequently adulterated by the addition of starch sugar in the form of syrup. There is a commercial American artificial honey which is entirely composed of glucose syrup, while the comb is also artificial and made of paraffin.

Treacle and **Syrup**, products of the sugar industry, have frequently glucose sugar as an adulterant.

Jams are very readily adulterated, since any tasteless vegetable tissue, such as vegetable marrow, turnips, etc., when mixed in jam, cannot be readily detected by the palate.

Mustard.—The adulteration most commonly met with is a dilution of ground mustard with wheat flour, and coloured by either turmeric or a special yellow coal tar product.

Pepper has been adulterated for at least two centuries and a half. Linseed meal, rice, wheat flour, sago, woody fibre, powdered laurel leaves, olive stones, bone dust, marine salt have all been used.

The various **spices**—ginger, allspice, nutmeg, cloves, and cinnamon—which are sold in powder form are specially liable to adulteration, various starches, stems, barks, sawdust, and ground olive stems all being used for this purpose.

Tea.—Leaves and other vegetable tissues other than those derived from the tea plant are used as adulterants for tea. The principal leaves used are the lime, hawthorn, and sloe. These can be detected by the chemical test—namely, every part of the tea-producing plant yields the active principle (theine) as a crystalline product, whereas leaves used as adulterants do not. The special form of adulteration known as "Facing of Tea" is thus described by M. S. Julien: The leaves are mixed either with powdered indigo, with powdered plaster, or with slaked lime, sometimes even all three substances being put together in small proportion to the tea leaves. These matters attach themselves to the leaves and communicate to them the bluish-green characteristic of green tea. Prussian blue is sometimes used instead of indigo.

Coffee is extensively adulterated, the chief agents used being roasted cereals of all kinds, potato flour, sawdust, ground date stones, peas, beans, and chicory. Chicory is added to some coffees and sold as an essence of coffee and chicory. Chicory influences the composition of coffee as follows (Blyth):—

1. It decreases the tannin, chicory being destitute of tannin.
2. It decreases the fatty matter, the fat of chicory ranging from 1 to 2 per cent., that of coffee from about 14 up to over 20 per cent.
3. It decreases the theine, chicory possessing none.
4. It increases the sugar, roasted coffee having usually about 2 per cent. of sugar, while chicory when roasted has at least from 8 to 9 per cent.

Cocoa.—The chief constituents of cocoa are these—namely, cocoa butter, theobromine, and cocoa red. It is often adulterated, particularly with tallow, sesame, and cocoa-nut oils, beeswax, and paraffin wax.

Vinegar may be adulterated with various mineral acids, especially sulphuric acid, and various organic substances, such as colouring agents and capsicum.

Lemon and Lime Juice are similar in their composition, containing citric acid as the predominant free acid, and a small amount of sugar and other organic matter. These drinks are rather extensively adulterated, and it is by no means uncommon to meet with a wholly factitious article under this name. The chief adulterants are tartaric acid, mineral acids, glucose, cane sugar, and various preservatives.

DISEASES CAUSED BY FOOD.

Ptomaine Poisoning.—This may arise from tainted meat, milk, or fish, more especially shellfish. Ptomaines are alkaloidal substances produced by decomposition, or putrefaction of proteins under the influence of bacterial action. Serious and even dangerous symptoms—pain, sickness, vomiting, collapse—may arise from eating food tainted as above. In the case of poisoning from eating tainted fish or mussels, the symptoms may arise within an hour or two, and affect mainly the central nervous system. Ptomaine poisoning more commonly arises from eating canned meats which have stood some time after opening. In these cases it may not be easy to determine whether the poison is derived from the tainted meat, or is due to metallic poisoning from the ingredients used in the process of tinning. It is well also to keep in view the possibility that it is the result of the preservative used. In addition to meat, milk, cream, ice-cream, and cheese may also be tainted and induce acute ptomaine poisoning. In connection with ptomaine poisoning, it is important to keep in mind the frequency with which idiosyncrasy is met with to special articles of diet, such as shellfish, strawberries, and the like.

Food-poisoning due to Poisoned Non-putrefying Meat.—Reference must be made to the occasional occurrence of cases of this kind—for example, turkey eating deadly nightshade leaves, followed by symptoms of atropine poisoning in the human subject; grouse and hares have been known to be poisoned through eating the tender shoots of the laurel and rhododendron shrubs; oysters similarly may be the cause of typhoid, from being taken from contaminated oyster beds.

Foods Containing Parasites or their Embryos.—Food sometimes serves as the medium for the introduction of parasites or their embryos, such as tapeworm, roundworm, echinococcus, and trichina. The chief source of infection is the use of raw or imperfectly-cooked flesh, a rarer source being the ingestion of vegetables that have been tainted from the excrement of infected animals. Trichinosis is acquired from eating ham or pork infected with the parasites. It may be a serious and is sometimes a fatal disease.

IX.

INFANT FEEDING.

BREAST FEEDING.

During the Second and Third Day.
Hours of Feeding.
Length of Time allowed at the Breast.

The Reasons for Weaning a Baby.

Failure to gain in Weight.
Fretfulness.
Colic.
Vomiting.
Constipation.
Diarrhœa.

WEANING.

ARTIFICIAL FEEDING OF INFANTS.

Cow's Milk.
Milk Preparations.
Proprietary Foods.
Foods suitable for Infant Feeding other than Milk, and Milk and Cereal Proprietary Foods.

Cow's Milk.

Modification of Cow's Milk.

To counteract the Impurities.
Scalding.
Pasteurization.
Sterilization.
Sterilized Milk.

Subsequent Care of the Milk.

Feeding Bottles and Teats.

Alteration of the Percentage Composition of the Nutritive Element.

Plain Water.
Barley Water.
Lime Water.
Fat Addition.
Sugar Addition.

Ingredients of Milk Mixture.

Alterations to Increase the Digestibility.

Use of Whey.
Citrated Milk.
Peptonized Milk.

PROPRIETARY FOODS.

Proprietary Foods made from Milk.

"Humanized Milk."
Condensed Milk.
Dried Milk Preparations.

Malted Cereals.

With Carbohydrates completely Malted.
Foods where the Carbohydrates are partially Malted.

Farinaceous Foods.

FOODS SUITABLE FOR INFANTS — OTHER THAN MILK AND CEREALS.

Albumin Water.
Raw Beef Juice.
Meat Broths.

DIET FROM WEANING UP TO EIGHTEEN MONTHS.

DIET FROM EIGHTEEN MONTHS TO TWO YEARS.

Chapter IX.

INFANT FEEDING.

The appalling mortality of infancy is due in no small degree either directly or indirectly to faulty feeding. The woeful ignorance in the feeding of infants is not limited to the very poor; it is by no means uncommon amongst the well-to-do industrial classes, who trust to advice from any one—for example, the mother who gave advice and said, "How can any one know better than I do? I have had fourteen children, and buried twelve!" There is reason for believing that this defective feeding is due more to ignorance than to lack of means. We shall treat of—

1. Breast Feeding.
2. Weaning.
3. Artificial Feeding.

BREAST FEEDING.

An infant at birth cries lustily; this is of value in promoting a healthy expansion of the lungs. If the child continues to cry it is supposed to be hungry, and the first mistake in its feeding is then made—namely, the nurse at once giving ordinary sugar and water, or milk and water. The sugar and milk may set up irritation in a child with a delicate digestion,

therefore it is better to avoid giving anything more than a couple of teaspoonfuls of cooled boiled water. Most healthy infants, however, are contented and happy after being washed and dressed, and require no food for the first twenty-four hours.

During the Second and Third Day.—After the first twelve hours the infant begins to be hungry. The secretion of mother's milk does not start before the third day after the birth, but it is advisable to put the child to the breast on the second day. By this means the baby empties the breast of the first milk, known as *colostrum*, which acts as a purgative, and clears out all the black material that is lying in the infant's bowel. The nursing should be done every six hours until the milk flow becomes established. Most babies require some extra nourishment, and it is best to give *sugar of milk* (obtained at the chemist), dissolved in hot water, the proportion being half a teaspoonful in half a pint of warm water. This should be sufficient, but in the case of a specially large and lusty child, a little milk and boiled water may be given —one teaspoonful of milk in six or eight teaspoonfuls of boiled water.

On the third day the milk flow commences, and at this time, and during the first three weeks, the mother needs every encouragement to persevere in the nursing. The discomfort from the engorged breasts, the tenderness of the nipples, the difficulty of making many infants suck properly, are all very real trials to the mother; and she often, from the lack of encouragement from the doctor and nurse, decides that she is unable to nurse, and the infant immediately is started on artificial feeding. This is frequently a mistake, and if the points now described are attended to, she can frequently continue to nurse, or partially nurse, with great advantage to the child.

For **breast feeding** there are two important rules.

1. *The child must be fed at regular and stated hours.*
2. *The child should not be allowed to remain at the breast more than from fifteen to twenty minutes.*

Hours of Feeding.—For first two months the child should be fed every two hours during the day, and not oftener than twice during the night—that is, between 10 p.m. and 8 a.m.

Hours for Feeding.	Interval.	Night Feed.	Total Feed.
From first week to end of sixth week...	2 hours ...	2 ...	10
End of sixth week to end of third month	2½ ,, ...	1 ...	8
End of third month to end of sixth month	3 ,, ...	1 ...	7
End of sixth month to weaning	3 ,, ...	0 ...	6

After 10 p.m. the baby should sleep as long as possible, and if it requires only one drink, say at 4 a.m., so much the better.

From the start the baby should be accustomed to miss one feed at night, so that at least four hours uninterrupted rest may be secured for the mother. This interval without food is gradually increased, so that at three months the child should go from 11 p.m. to 5 a.m. After six months a healthy infant may be allowed to sleep seven to eight hours at night without being disturbed for food.

The question whether an infant should be roused during the day is an important one. It is certainly better to keep strictly to the feeding hours, and the infant will become regular in its habits, waking at the right time and sleeping through the night. The monthly nurse can do much to establish good habits, and if once started rightly the healthy infant gives little trouble. Neglect of regular hours is often the main cause of flatulence, colic, hiccough, fretfulness, and sleeplessness.

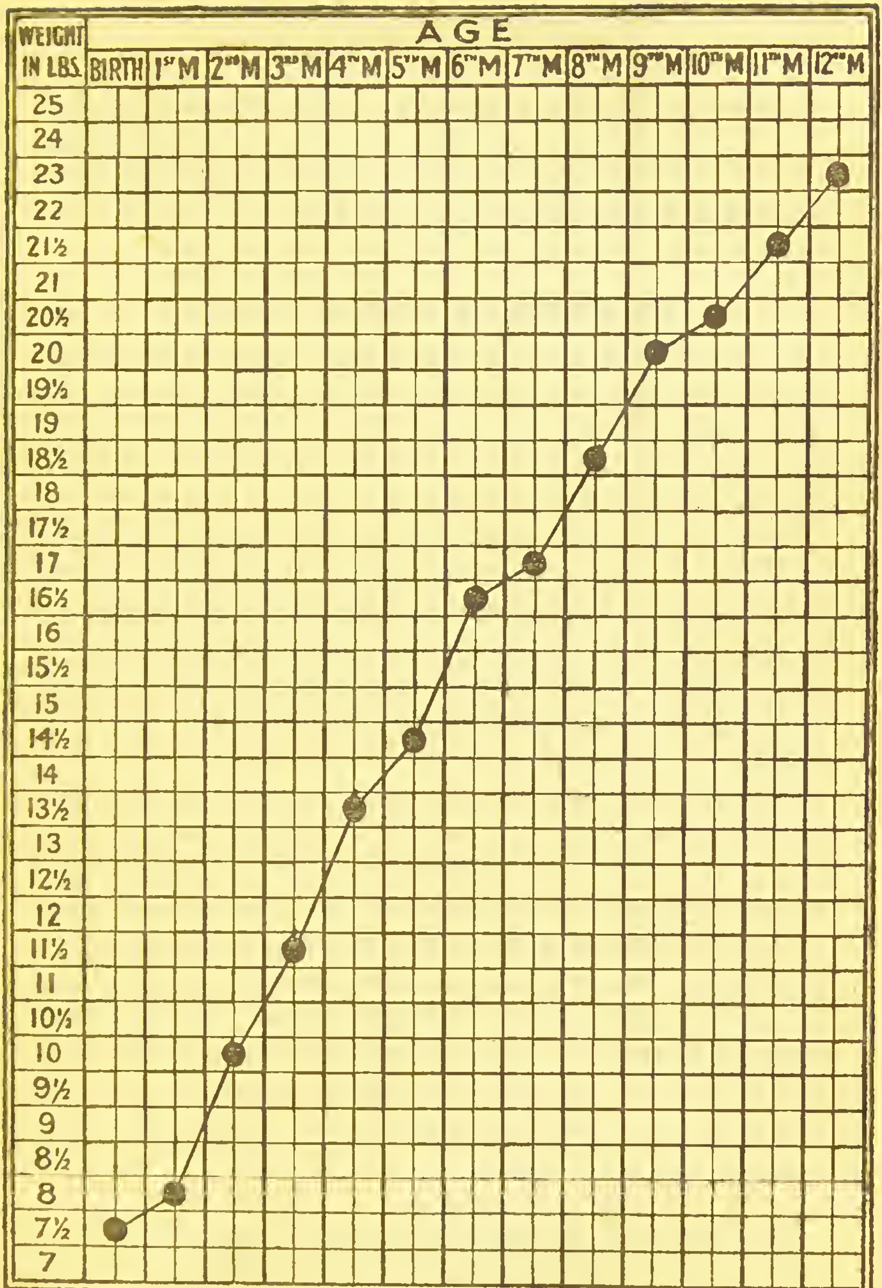
Over-frequent and irregular suckling stimulates the mother's breast too much, and affects the quality of the milk in such a way as to render it less digestible.

Length of Time Allowed at the Breast.—As it is impossible to gauge the amount taken by the infant at the breast, it is safer to feed by time. The child soon learns that it is expected to take the breast and suck steadily for ten to twenty minutes. This allows an ample supply of milk, even to a child with feeble sucking powers. If one breast is empty before the feed is ended, the other breast may also be given.

When nursing, the mother should sit in a low chair, with the infant on a pillow; when it is small, this allows the nipple to get into the child's mouth without straining the mother.

If these two rules are adhered to, what are the *signs of a thriving infant?*

1. The child gains steadily in weight after the first week. A healthy child should gain four ounces per week (see Chart).
2. The child sleeps well. A healthy child should fall asleep after food, or lie awake contented and happy. When an infant, though gaining in weight, frets and cries and disturbs the house, it is suffering from indigestion in some form. There is also the *good baby*, who does not gain in weight, but actually loses weight week by week. This is much less troublesome in the home than the fretful baby, but is the cause of much more anxiety. The child does not have indigestion, but it fails to assimilate its food. This type of malnutrition should invariably be under a doctor's care.
3. The child is anxious for its food, and, after feeding for ten or twenty minutes, is quite satisfied.



Weight Chart for the first year; the curved line indicates the average rate of gain (after Holt).

4. The bowels move regularly. There should be at least two motions in the twenty-four hours, of the consistence and colour of thickly-made mustard, and there should be no curd in the motions.

The Reasons for Weaning a Baby.

As has been said above, the infant ought to be breast-fed for eight months if possible. If the mother can't do the whole of the nursing, she should give as many feeds as possible, and make up with an artificial food. The feeding is then spoken of as mixed feeding.

There are some *maternal conditions when nursing is contra-indicated.* If the mother is acutely or seriously ill, she is probably not able to nurse, and if she is tuberculous or epileptic, or if exceedingly delicate, she should not attempt to nurse. When, on two or three previous occasions, attempts at nursing have proved failures, artificial feeding must be adopted.

Weakly-looking subjects may make as good or better nurses than big strong women; emotional and highly-strung natures do not, as a rule, make good nurses. Undue physical and mental excitement acts unfavourably on the secretion of milk.

The following signs show that the breast feeding is not being carried out satisfactorily, some alteration either on the side of the mother, or on the length of time between meals, or on the regularity of the feeding time, being called for:—

1. Failure to gain in weight.
2. Fretfulness.
3. Colic.
4. Vomiting.
5. Constipation.
6. Diarrhœa.

Failure to gain in weight may be due to one of two causes :—

1. There is not sufficient milk being secreted, or
2. There is some quality in the milk interfering with the child's power of absorbing the milk properly and causing indigestion.

If the breasts are not secreting enough to feed the child at alternate meals, both may be used for a feed; the infant may cry when the breast is taken away, even if it has sucked for longer than the usual period. The breasts themselves may not fill up before the meal, and it may be difficult to squeeze even a small quantity of milk from the nipple. This condition may be transitory—from the mother being too tired or from some emotional cause.

A longer rest in the daytime is sometimes indicated. It is sometimes advantageous to keep the infant in another room at night, and just bring it to the mother at the nursing hours. An increase in the mother's food may be indicated. An increase of red meat (chop or grilled steak) or a little extra milk may improve her nursing powers. However, if, in spite of these precautions, the infant still fails to gain, artificial feeding must be substituted at two or three meals in the twenty-four hours, and this mixed feeding is very much better for the baby than complete artificial nourishment.

Fretfulness.—On the other hand, the breasts may appear full and overflowing, and yet the infant fails to gain in weight, and is fretful, cries often, and sleeps badly. These babies may pass undigested food in the motions in the form of curd, or the motion may be green in colour. The question arises, Is the mother taking indigestible food and causing indigestion herself, or is she very constipated?

The mother should put herself on the simplest of food—fish, egg, meat, milk—for some days, take a good dose of

castor oil, and, if constipated, attend carefully to the regular action of the bowels. Lengthen the time between the feeds by half an hour. This makes the milk become more watery.

The breast milk can be still further diluted by giving the child three or four teaspoonfuls of cooled boiled water five or ten minutes before each feed. If the infant is passing curd, a dose of castor oil (one teaspoonful) is often beneficial.

If the motions are green, a doctor should be consulted. It is unnecessary to say again that the rules of regular hours of feeding and time at the breast should be strictly adhered to. If, in spite of giving these suggestions a fair trial, and the infant for two or three weeks does not gain in weight, and shows signs of discomfort, it will be necessary to wean him, as there is probably some ingredient in the mother's milk which does not suit.

Colic is a great trial to many babies. Occasional attacks are the fate of almost all, but some have it constantly in spite of all that can be done in the way of regulating their feeds. Yet these children may gain in weight. It is very distressing; but a child that suffers from colic when breast-fed will probably suffer *more* from colic if artificially fed. The suggestion as to the mother's diet, lengthening time between meals, the giving of water or lime-water (a table-spoonful before meals), an occasional dose of lime-water, five or six drops of essence of dill in warm water with a little sugar of milk, all help, and as the child grows older it gets less inclined to have these attacks.

Vomiting.—Many children shortly after feeding bring up mouthfuls of milk which is not sour or curdled (this is posseting), and is simply the overflow from an over-distended stomach. If the child vomits mouthfuls of sour-smelling fluid any time over half an hour from its last meal, it is suffering from indigestion, and the suggestions laid down on

page 179 should be given effect to. The mother should eat less and drink more fluid, and take more exercise. If this vomiting still continues after these remedial measures have been adopted, the medical adviser should be consulted.

Sometimes a child vomits by shooting with considerable force the stomach contents from its mouth. Such a case of "projectile vomiting" should be under the doctor's care.

Constipation is a common condition among breast-fed infants, and when present is often very obstinate in yielding to treatment. In these cases the motions lose the "mustard colour" and have a grayish tinge.

The mother must attend to her own diet and see that her bowels are kept active. She should take more cream and butter, fruit and meat, and less milk. The idea of laxative drugs taken by the mother purging the child by being excreted by the milk is not generally correct, except in the case of castor oil, which apparently in many cases does affect the child. Other drugs which purge the mother seem only to alter the quality of milk and upset the child. If altering the mother's diet is not sufficient, the infant may have three times a day half a teaspoonful of cream (or more), diluted with two teaspoonfuls of boiled water, or the same amount of best olive oil in a little hot water. After the child is three months old, orange or grape juice (a teaspoonful thrice daily) may be given. The child's abdomen may also be gently rubbed, or the constipation may be combated by the use of a glycerine injection or a soap and water enema. But before starting any of these remedies the child should be seen by a doctor. The habitual use of drugs is not to be recommended. Castor oil is the best to be used occasionally. Dinneford's fluid magnesia, Phillips's milk of magnesia, or a few drops of syrup of figs, may also be used.

Diarrhœa is very rare with breast-fed infants, but may occur after a chill or from some indiscretion on the mother's part. If it does supervene, clear out the bowels with a dose of castor oil, rest the digestive tract by not nursing for twelve hours, and afterwards giving alternate breast feeds and feeds of albumin water (p. 53). This may be continued for another twenty-four hours. The breasts will have to be relieved by the breast-pump, otherwise they become very painful.

WEANING.

This process should be gradual, and take from three to five weeks to accomplish. If a baby has been entirely *breast-fed*, the ninth month is a good time to make the change from breast to artificial feeding; but if the child is cutting teeth, or if the weather is very hot, the change should be delayed for a few weeks. If the child is eight months old or more, it is a mistake to start the child on the bottle; it should be fed by spoon or drinking cup. In weaning a child we should aim at giving at first a weak artificial food; this would be applicable to a bottle-fed baby of the same age.

A suggested table of the process of weaning is given on p. 187.

When from social or other causes, as mentioned above, it is found necessary to supplement the mother's milk with artificial food during the earlier months, the process is somewhat different from what has just been described. The mother may be able to nurse the child only during part of the day or during the night.

Under these circumstances the hours for feeding must be strictly adhered to, and the infant here begins with a milk and water mixture (or other artificial food) corresponding in strength to that for an infant four or six weeks younger, and

	First Week.	Second Week.	Third Week.	Fourth Week.	Fifth Week.
6.30 to 7 a.m. ...	Breast.	Breast.	Breast.	Breast.	Milk, 7 oz.; water, 1 oz.; cream, ½ oz.
9.30 to 10 a.m. ...	Breast.	Milk, 4 oz.; water, 4 oz., thickened with a proprietary food (Allenbury—Savory and Moore).	As second week—increase milk, lessen water.	Milk, 6 oz.; water, 2 oz., thickened with oat flour or farola (sweetened).	Gruel as fourth week.
12.30 to 1 p.m. ...		Breast.	Breast.	Milk, 6 oz.; water, 2 oz.; cream and a crust.	Milk as fourth week.
4 to 4.30 p.m. ...	Milk, 4 oz.; water, 4 oz. (sweetened and warm); a crust to suck.	Milk, 5 oz.; water, 3 oz.; cream, 2 teaspoonfuls (sweetened).	Same as 9.30 meal, and thickened with proprietary food.	As in third week.	Milk with proprietary food.
6.30 to 7 p.m. ...	Breast.	Breast.	—	—	
11 p.m.	Breast.	Breast.	Milk, 5 oz.; water, 3 oz.; cream, 2 teaspoonfuls (sweetened).	As in third week.	Milk as in third week, and a crust.
			Breast.	Breast.	Milk as at 6.30 a.m.

A little fruit juice (1 teaspoonful) may be given and a drink of water between meals.

the mixture is gradually strengthened till it is of suitable strength for the infant of that particular age. (For details, see under "Artificial Feeding.")

ARTIFICIAL FEEDING OF INFANTS.

When it is found that it is impossible to feed the baby on the breast for some of the reasons above noted, it is necessary to have recourse to artificial feeding. The different methods of artificial feeding must be considered in some detail. The choice of food has to be selected from the following :—

1. **Cow's Milk.**—Milk from goat, ass, and mare may be employed, but is seldom practicable.

2. **Milk Preparations**—

Humanized milk.
Whey.
Citrated milk.
Peptonized milk.
Condensed milks.
Koumiss.

3. **Proprietary Foods**—

Dried milks.
Malted cereal foods.
Partially malted foods.
Farinaceous foods.

4. **Foods suitable for Infant Feeding other than Milk, and Milk and Cereal Proprietary Foods**—for example :—

Albumin water.
Malt soup.
Raw beef juice.
Meat broths.

Cow's Milk.

For all practical purposes this is the only milk that needs to be considered, the facility with which it can be obtained everywhere placing it within the reach of all. It is necessary to again emphasize the importance of getting milk from a source which is scrupulously clean. In view of the great danger incurred by the child by drinking milk infected with tubercle or other germs, the importance of this cannot be too greatly emphasized.

If the chapter on "Milk" (p. 34) be carefully studied, it will be seen that cow's milk requires modification to make it conform to the composition of human milk, and to carry out this modification intelligently a knowledge of the essential differences between the two milks is necessary. The table on p. 34 shows that the chief differences between the two milks are :—

1. Cow's milk contains a much larger amount of protein.
2. This protein, when curdled by the stomach ferment, rennin, forms a coarse, tough curd, which is more indigestible than the delicate curd of human milk.
3. (*a*) Human milk is sterile, cow's milk is not—hence the necessity for scalding or pasteurizing.

   (*b*) Cow's milk must, therefore, be treated in such a way as to make it conform in purity and in chemical composition, as much as possible, to the mother's milk. This is effected in the manner now to be described.

Modification of Cow's Milk.

1. To counteract the impurities and management of the milk in the home.

2. Alteration of the percentage composition of the nutritive elements.
3. Alterations to increase the digestibility.

To Counteract the Impurities.—Cow's milk as it reaches the consumer contains a large number of bacteria. If the milk is from healthy cows, and has been collected and conveyed in a cleanly way, these bacteria are of a harmless variety, and are not excessive in number. If, on the other hand, the sanitary conditions in the dairy have been defective, or if the cows have been affected with tuberculosis, serious diseases may be conveyed by the milk—for example, typhoid fever, scarlet fever, diphtheria, tuberculosis.

On account of the grave risk of infection through milk, much more attention is now being paid to sources of supply. The inspection of dairies, cow-sheds, etc., has resulted in much more cleanliness in handling the milk, and when it is withdrawn it is now quickly cooled and kept on ice. This is found to reduce the number of bacteria. Cold hinders the development of bacteria, and thus limits the degree of impurity of the milk. In hot weather milk is chiefly responsible for that most terrible menace to infant life, "summer diarrhœa."

In order to ensure the *destruction of germs*, the milk must be subjected to heat. The application of heat of various degrees for different lengths of time destroys the germs, but at the same time impairs to a certain extent the nutritive value of the milk. The milk before heating must be fresh; no amount of heat will make turned milk fit for infant food. There are three methods adopted for destroying the bacteria—namely, *scalding*, *pasteurizing*, and *sterilizing*. In these the milk is not absolutely freed from bacteria, but all the most dreaded pathogenic (disease-producing) bacteria are destroyed. In the third method—sterilization—the milk is

exposed to a great heat for a sufficient time to destroy all the germs present.

Scalding.—By this is meant rapidly bringing the milk to boiling point, and then at once stopping the process by quickly cooling the milk. It is advisable to stir the milk frequently during the heating, so that the whole of it may be heated to boiling point. Sufficient milk to last twelve hours can be prepared at a time. The proper quantity of milk and cream and water should be mixed before boiling. After boiling, the mixture should be put at once into clean bottles, which are closed with tight-fitting stoppers, and should be at once placed in cold water to cool rapidly. Laboratory experiments show that, for all practical purposes, milk which has been treated thus is a perfectly safe food; even virulent tuberculous milk is rendered innocuous after an exposure of five minutes to a temperature of 185° F.

Pasteurization means keeping the milk at a temperature of from 155° to 165° F. for twenty or thirty minutes. This is found to render the milk innocuous, so far as disease-producing germs are concerned. Its effect on the milk is similar to that of scalding: it does not make the milk sterile. This method is more troublesome and no more efficacious than scalding and quickly cooling. The same apparatus as described under sterilization is used, but a lower temperature is maintained.

Sterilization means the destruction of all bacteria and spores, so that milk so treated will keep indefinitely. This requires the milk to be kept at a temperature of 212° F. for at least forty minutes, and subsequent rapid cooling.

Various apparatus are made for the purpose under the name of "milk sterilizers," which are also used for pasteurizing. It consists of a double pan; water is placed in the outer vessel, and a thermometer is attached, and the milk is

in the inner vessels. The water for pasteurizing is raised to from 155° to 165° F., and the source of that heat is removed, and the milk is allowed to stand twenty minutes.

If the milk is allowed either to boil, and much more so if it be sterilized, some change is effected in the milk, so that the long use of such milk produces infantile scurvy, the milk having lost its antiscorbutic power. Occasionally, also, infants who have continuously been fed on milk boiled for ten or fifteen minutes may show no sign of scurvy, but are not getting on; they are peevish and miserable, the skin shows an earthy pallor, the muscles are flabby, and the child generally presents the appearance of malnutrition and cachexia.

To sum up. All these methods of preparation are to be regarded as necessary evils and not as virtues in themselves; but until all risk of contamination from the milk has been eliminated, one or other system must be adopted, and preferably that of scalding the milk.

Sterilized Milk is now widely sold for commercial purposes, and can be obtained in most towns, and "humanized milk" as sold in the shops is also sterilized; the latter is open to the same objection as the sterilized milk. These sterilized preparations are very useful where, for any reason, as in travelling, it is impossible to obtain fresh milk. In some cases, also, sterilized milk seems to be more easily digested than milk prepared in other ways, but this is quite exceptional.

Subsequent Care of the Milk.

All jugs and bottles to be used for storing the milk must be scrupulously clean; this should be effected by boiling.

As soon as the milk has been heated and prepared, it should be measured into the clean bottles, and carefully

stoppered with tight-fitting stoppers. These will supply the feeds for the day.

After preparation, the bottles should be stood in water to cool rapidly. The advantage of these arrangements is that the bottles are prepared at one time, and only require the stopper to be removed and the rubber teat to be put on. The milk bottles should be warmed when required by standing for a few moments in a jug of boiling water.

Feeding Bottles and Teats.

The infant's feeding bottle must never be one to which a tube is attached, as efficient cleaning is then impossible. A suitable bottle is one that can be easily cleaned—a number of different shapes are on sale—but a cylindrical one with no corners to clean out is probably the most satisfactory, and it is best to have enough bottles (four or five), so that the meals need not be prepared oftener than twice in the twenty-four hours. To these bottles a teat only is attached, which is fastened on just before use. The teats can easily be procured of varying sizes, and the best are those made of plain black rubber.

The hole in the teat should not be too large, but sufficient to allow the milk to drop out when the bottle is inverted. If the milk comes too quickly, the infant gulps it down, and is very apt to be sick afterwards. A teat after being in use some time tends to have too large a hole.

The most scrupulous care of bottle and teat is absolutely necessary. After use, the bottle should be well washed out with boiling water, and allowed to stand filled with water until used. The teat especially must be carefully cleaned and turned outside in after each feed, and allowed to lie in boracic lotion when not in use. An occasional thorough boiling of the bottles and teats is a good preventive measure.

Alteration of the Percentage Composition of the Nutritive Element.

As has been noted, the essential difference between human milk and cow's milk lies in the larger quantity of protein in the latter and its more indigestible quality. In order to reduce the excess of protein, the milk must be diluted in one of the following ways :—

1. **Plain Water** is most commonly used; it reduces the percentage of protein, and also lessens the size of the curd. This is often quite sufficient; sometimes, however, the digestion of the curd has to be assisted by using a thickened diluent.

2. **Barley Water.**—This sometimes suits when the dilution with plain water does not. It probably acts by mechanically hindering the formation of the large curd. As a food, barley water is of little value, and contains a little starch, which may sometimes cause flatulence, colic, and diarrhœa in very young children. In a constipated child, barley water is often a very satisfactory laxative. Rice water (p. 400) and oatmeal water (p. 400) can be used in the same way. Rice water is advantageously used when there is any tendency to diarrhœa. Oatmeal water has also a laxative effect. Gelatine, in the form of a thin jelly, may also be used.

3. **Lime Water** used in the proportion of 1 tablespoonful to 3 oz. of milk and water mixture, as well as acting as a diluent, acts by lessening the size and toughness of the curd, and its alkalinity is useful in the milk. Bicarbonate of soda and fluid magnesia can also be used.

It has been found that sodium citrate, in the proportion of 2 grains to 1 oz. of milk, prevents the curd formation altogether. The use of it as an ingredient to be continued for any length of time is not to be recommended.

Fat Addition.—After the dilution to reduce the protein, the milk will have too small a proportion of fat, and, therefore, it is necessary to add fat in the form of cream—obtained by standing the milk for some hours and pouring off the cream.

Sugar Addition.—The carbohydrate of the cow's milk is also too much reduced by the dilution, and it is found best to add milk sugar. This is added to the diluted milk. Cane sugar may be used, and a lump about half an inch square would be about equivalent to a level teaspoonful of the milk sugar. These modifications produce a "milk mixture" closely resembling human milk, which can be made suitable for infants of different ages.

The strength, quantity, and number of feeds of the mixture vary with the age of the child, and the following table will be a good guide:—

Ingredients of Milk Mixture.

Measure out the ingredients and dissolve the milk sugar in water of the mixture before adding other ingredients. Scald, pour into bottle, close tightly, and cool rapidly. It is most convenient to prepare the required quantity twice daily.

Age of Infant.	No. of Feeds in 24 Hours.	Quantity at 1 feed.	Amount at one Time.	Note.
3rd–10th day.	10 feeds, every 2 hours from 8 p.m. to 10 p.m.; 2 feeds during night.	1 oz. or 2 table-spoonfuls.	Milk, 2 teaspoonfuls. Milk Sugar, $\frac{1}{4}$ teasp. Water, $1\frac{1}{2}$ tablesp.	
10th day, increasing to end of 1st month.	Same as above.	$1\frac{1}{2}$ to $1\frac{3}{4}$ oz.	Milk, $\frac{1}{2}$ to $\frac{3}{4}$ tablesp. Milk Sugar, $\frac{1}{2}$ teasp. Cream, $\frac{1}{2}$ teaspoon. Water, $1\frac{1}{2}$ tablesp.	More water than milk: 1 milk to 3 water.
Food during 2nd month.	Food every $2\frac{1}{2}$ hours, and once at night. Total, 5.	2 oz.	Milk, $1\frac{1}{2}$ tablespoon. Milk Sugar, $\frac{3}{4}$ teasp. Cream, 1 teaspoon. Water, $2\frac{1}{2}$ tablesp.	More water than milk: 1 milk to 2 water.

Age of Infant.	No. of Feeds in 24 Hours.	Quantity at 1 feed.	Amount at one Time.	Note.
Food during 3rd month.	2½ hourly; 1 feed at night.	2½ to 3 oz.	Milk, 2½ to 3 tablesp. Milk Sugar, 1 teasp. Cream, 2 teaspoon. Water, 3 tablesp.	Almost equal parts milk and water.
Beginning 4th month.	7 feeds every 3 hours; 1 at night.	4 to 4½ oz.	Milk, 4 to 4½ tablesp. Milk Sugar, 1 teasp. Cream, 2 teaspoon. Water, 3½ tablesp.	More milk than water.
5th month.	7 feeds as above.	5 oz.	Milk, 6 tablespoon. Milk Sugar, 1 teasp. Cream, 3 teaspoon. Water, 3 tablesp.	2 pts. milk. 1 pt. water.
6th month.	6 feeds during day (3 hourly); discontinue night feed if possible.	6 oz.	Milk, 8 to 9 tablesp. Milk Sugar, 1 teasp. Cream, 2 to 3 teasp. Water, 2 to 3 tablesp.	3 pts. milk. 1 pt. water.
7th month.	3 hourly, 6 feeds; none at night.	7 to 7½ oz.	Milk, 10 to 12 tablesp. Milk Sugar, ½ teasp. Cream, 1 teaspoon. Water, 1 to 3 tablesp.	
8th month.	3 hourly, 6 feeds; none at night.	8 oz.	Milk, 12 to 14 tablesp. Milk Sugar, ½ teasp. Cream, ½ to 1 teasp. Water, 1 to 2 tablesp.	

It must, however, be kept in view that no table suits every child; a delicate baby may require a more diluted milk, while a large healthy child can take a stronger milk mixture. The diluent may take the form of barley water, rice water, or lime water, according to the indications set forth above.

The rules for regularity and hours of feeding given under "Breast Feeding" are applicable to artificial feeding.

A further milk mixture can be prepared, known as the "cream mixture," but it requires constant skilled supervision, and is not suitable for children not under medical

observation. The milk mixture already described is now prepared and given out by institutions for feeding babies of the poorest classes in many large towns, who are quite unable to give the time and care to preparing an infant's food properly. This is supplied at almost cost price.

If it is found that cow's milk, correctly diluted, with the addition of cream and sugar of milk as indicated, does not suit the infant, steps must be taken to improve the digestibility of the milk, as follows :—

Alterations to Increase the Digestibility.

At any time during the first eight months of infancy an attack of illness may supervene, in which, for the time being, the infant's powers of digestion are diminished, and one of the following methods of increasing the digestibility of the milk may have to be adopted :—

(*a*) **Use of Whey.**—Whey is very useful where children are unable to digest casein, as in cases of exhaustion after acute diarrhœa, or in the last stages of wasting (marasmus). It is commonly prepared by adding one teaspoonful of essence of rennet (Mackay's) or Benger's curdling fluid to half a pint of milk at about blood-heat (98° F.), allowing to stand in front of the fire until the curd has set, then breaking up the curd with a fork, allowing to stand for fifteen minutes, then straining through muslin, and finally heating the whey to boiling point. Whey thus prepared contains a little soluble protein (lactoalbumin), and most of the milk sugar, very little fat, and almost all the inorganic salts of the milk. It can also be made by using sherry : heat half a pint of milk to boiling point, add a good wineglassful of sherry, then bring to boiling point, and allow it to stand until the curd has settled, then strain through muslin. For infants

whose digestion has become enfeebled by a long course of unsuitable diet, and who seem unable to digest anything, the sherry whey acts as a stimulant to the gastric functions and is an easily assimilated food, so that after a few days it is possible to add cautiously other food, and so gradually get the infant back to more nourishing diet.

If whey has to be taken for more than a few days, it is advisable to add cream; and many infants make excellent progress for a week or two on a whey and cream mixture, such as the following:—

Whey	... 4 tablespoonfuls.
Cream	... ½ to 1 teaspoonful.
Milk Sugar	... ½ teaspoonful.

(*b*) **Citrated Milk.**—The addition of sodium citrate in the proportion of one grain of the citrate to one ounce of milk modifies the toughness of the curd in a very favourable manner, and is sometimes of great value in the feeding of infants. This method of modifying the milk should only be used for a short time. Constipation is a frequent symptom of infants fed with citrated milk.

(*c*) **Peptonized Milk.**—By artificially digesting the food (peptonizing) previous to its administration, the digestive powers of both stomach and bowel are rested, and this method of feeding is often of great value. The peptonized milk should never be continued unduly. It is necessary to give the digestive powers some work to do, so the peptonizing must be gradually lessened, then stopped; it should not be continued for more than from four to six weeks. For infants, Fairchild's peptogenic milk powder may be recommended, and is used according to directions. Extract of pancreas (Armour's), with soda bicarbonate added, and Benger's liquor pancreaticus are also reliable preparations.

PROPRIETARY FOODS.

The name of these is legion, and it is impossible to describe them in detail. The art of the advertiser is used to induce mothers to try their foods, and the fact that the names of these foods are constantly before the public induces their use to an extent which is uncalled for and injudicious. There are very few cases in which any of these proprietary foods should be allowed to become the principal article of diet, and, in spite of all the advertisements and testimonials adduced, there is not a single infant food in the market which can adequately replace cow's milk as a food for infants.

There are three main groups of proprietary foods :—

1. *Made from milk*—for example, humanized milk, condensed milk, and dried milks.
2. *Malted cereals ;* these may be completely malted and the starch wholly changed, or partly digested only.
3. *Farinaceous foods.*

The value of the individual preparations depends upon two factors, namely: (1) *the amount of fat present, and* (2) *the extent to which starch has been converted into a soluble sugar.*

The low proportion of fat present in all the preparations makes them quite unfit for infant food unless cream is added. None of the "infant foods" which contain unconverted starch should be given to an infant under six months, and most infants are much better without any of these preparations until they are nine months old.

All these proprietary foods, if given alone for any length of time, induce infantile scurvy. The food, in some way, is devitalized in the process of manufacture, in the same way as milk is affected by sterilizing, and general malnutrition results. Many infants fed on these foods, without showing

the typical symptoms of scurvy-rickets, spongy gums, tenderness of the limbs, hemorrhages into the ends of the long bones, show signs of impaired health—for example, earthy colouring, cachexia, and malnutrition, which are closely dependent on feeding with these prepared foods.

If, therefore, any of these preparations are to be used for more than a few weeks, fresh food in some easily digested form must be substituted—for example, white of egg in albumin water (p. 53), raw meat juice (p. 384); lemon whey, a teaspoonful of orange juice. The necessity of this is recognized by some of the makers of these foods, who give directions as to the simultaneous giving of fresh food.

Proprietary Foods made from Milk.

"Humanized Milk."—This is the name given to milk specially modified and then sterilized so as to conform as nearly as possible to human milk. It is sold in various strengths, and can be procured from the larger dairy companies. The principles of preparation are identical with those described for the home modification of milk, but it is devitalized by sterilization. As a temporary measure such milk is often of great value where for any reason it is impossible to carry out the careful modification of cow's milk at home, but the home-made preparation is to be preferred.

Condensed Milk.—This is cow's milk which has been evaporated *in vacuo* and sterilized by heat. The variations—whole unsweetened, whole sweetened, and skimmed and sweetened—are fully described, with their advantages and disadvantages, on p. 46.

Condensed milk should not be used as the only food for an infant except for very short periods, as in travelling or

during very hot weather. A very large proportion of infants fed on condensed milk develop rickets—partly, no doubt, owing to the excess of sugar and the deficiency of fat. The lack of freshness in the food is an additional factor in the production of infantile scurvy.

Dried Milk Preparations.—These are often particularly well digested by infants who are quite unable to digest ordinary cow's milk, and they are useful foods to give in combination with breast feeding. The fresh mother's milk given two, three, or four times daily does away with the objection to their not containing the vital elements of fresh milk. Some of the best known are "Allenburys" foods, No. 1 and No. 2, and Horlick's malted milk, which all contain a satisfactory amount of fat. These dried milk foods are made with the addition of boiled water, and, on account of an acid added during their preparation, the curd is much finer than in ordinary cow's milk, and is an easily digested one. These foods prove to be rather acid for some infants, but this can be readily corrected by the addition of a pinch of bicarbonate of soda to the bottles.

Nestlé's milk food and Manhu infant food are mixtures of desiccated milk with a partially malted wheat flour. Neither of these is suitable for an infant under six months of age.

Malted Cereals.

1. **With Carbohydrates completely Malted.**—These can be given at a much earlier age than those which contain unconverted starch. Mellin's food is the best known of this class of food. All the carbohydrates are in a soluble form. It is made up with milk, and, if made according to directions, there is little or no objection to its use. The addition of one or two teaspoonfuls of Mellin's food to one or two of the

bottles daily proves useful, by helping the digestion of the milk. This food has a laxative effect, and should not be used if there is any tendency to diarrhœa; but if there is obstinate constipation and poor digestion, Mellin's food may be given once or twice daily in the milk as early as the third month.

2. **Foods where the Carbohydrates are partially Malted.**—After preparation, as directed, these foods contain some unconverted starch. The best of them are taken mixed with milk; they are deficient in fat. When used made with milk they are sometimes of service during the eighth, ninth, and tenth months, but should not be given earlier than the sixth month. They should not be given with every feed; once or twice in the day is usually sufficient. The best known of this class are:—

Savory and Moore's Food is composed of wheat flour and malt. When prepared with milk almost all the starch is converted into the soluble form.

Benger's Food.—A mixture of wheat flour and pancreatic extract. When prepared according to directions, almost all the carbohydrate is converted, and the protein of the milk is partially digested. This is a very good preparation to start with for a delicate baby who is being weaned about the seventh or eighth month.

"*Allenburys*" *Malted Food* (No. 3).—A mixture of wheat flour and malt. When prepared as directed it still contains some unaltered starch.

Diastased farina contains very little unaltered starch.

Nutroa Food.—A mixture of cereals, containing pea-nut flour, which gives it a bitter taste. It is self-digesting, but when prepared for use still contains much undigested starch.

Coomb's Malted Food also contains much unaltered starch.

Farinaceous Foods.

Farinaceous Foods, in which there is little or no conversion of the starch, are not suitable for infants under ten months. These include Ridge's food, only good if made with milk; Neave's food, only good if made with milk; Frame food, a food specially rich in nitrogenous matter; entire-wheat flour; Robinson's patent groats; Robinson's patent barley; Chapman's whole flour; Scott's oat flour; Robbs's baby biscuits, rusks, etc.

It is certain that some infants digest such foods as early as the seventh month, but these are the exceptions, and their use at this time more often results in flatulence and colic or more serious forms of indigestion. The use of these foods before the sixth month is frequently seen in the children of the poor, and a serious state of health, leading to marasmus and not infrequently death, may be attributed to this.

FOODS SUITABLE FOR INFANTS—OTHER THAN MILK AND CEREALS.

Albumin Water is made from white of egg (see p. 53) It is of value chiefly as a protein food, and is useful in those rare cases where the infant is unable to digest the proteins of cow's milk. It is also of value in cases of severe vomiting and diarrhœa, where it is advisable to withhold all other nutriment for twelve or twenty-four hours.

Raw Beef Juice is a very useful article of diet, and its preparation is described on page 384. When given well diluted it is readily digested by infants, and provides protein in cases where the protein of cow's milk cannot be digested. It can also with advantage be given to supply the fresh

element in an infant's food in the case of infants fed very largely on sterilized food, or on the various proprietary preparations.

An infant of six months may take a teaspoonful of raw meat juice in a spoon, or mixed with diluted milk, or with cream and water, three or four times daily. An infant of twelve months can take an ounce of raw beef juice in twenty-four hours.

Beef extracts (see p. 141) are of no value in infant feeding, and should never be given.

Meat Broths.—For babes under nine months, five or six ounces of a weak chicken-tea or a veal-and-mutton-tea (p. 381) may be given as a temporary measure in cases of troublesome vomiting or diarrhœa, combined with alternate feeds of albumin water or whey.

DIET FROM WEANING UP TO EIGHTEEN MONTHS.

Supposing the child has the bottles stopped by the time it is ten months old, it should then be having five or six meals in twenty-four hours—the first at 7 a.m., and the last at 10.30 or 11 p.m. Milk is still the staple food. The infant may have three drinks of milk consisting of about six ounces, with a crust and butter, or bread and butter, and three meals made with some of the cereals, two of these meals being preferably made up of partially digested foods. Shortly after this the midday meal may be replaced with veal, mutton, or chicken broth, or a cup of beef-tea, thickened with crumbs, and a small drink of milk. Later, gravy thickened with bread crumbs or potatoes, the fat of fried bacon in which crumbs are soaked, or a lightly boiled egg beaten up with milk and crumbs, may be given.

The farinaceous foods, such as an oatmeal gruel or Chapman's entire-wheat flour, are now useful.

The child should be encouraged to chew crusts and various rusks for the sake of its teeth. Orange juice, grape juice, and roast apple pulped, may also be given.

Age.	7 a.m.	Breakfast. 9 a.m.	Dinner. 12.30 or 1 p.m.	Tea. 4.30 p.m.	Supper. 7 p.m.	"Night-cap." 10.30 p.m.
9 months.	Milk.	Basin of gruel, cream, and drink of milk.	Allen and Hanbury's or Savory and Moore's, milk, and juice of orange.	Milk, crust and butter.	Allen and Hanbury's.	Milk.
10 months.	Do.	Do.	Milk, and broth skimmed from mutton, veal, or chicken. Cup of beef-tea, or lightly boiled egg, with milk and bread crumbs.	Milk, bread and butter, sponge cake, or rusk and butter.	or Robbs's baby biscuits with milk.	Milk.
11 months.	Do.	As above, and vary the cereal. Frame food, barley meal gruel, wheat flour.	As above, and gravy, or broth, thickened with bread crumb or rusk or well-mashed potato. Always *milk*.	As above.	As above, or a gruel.	Milk.
12 months.	Do.	Porridge, rather thin gruel, cream, and milk.	As above, giving also pulped roasted apple, or curds and cream.	As above.	As above; follow by a crust and butter.	Milk.

DIET FROM EIGHTEEN MONTHS TO TWO YEARS.

The child should now entirely stop the late drink of milk at 10.30 p.m., and, if sleeping well, in the mornings should stop the 7 a.m. milk, but in this case the breakfast will have to be about eight o'clock, and a drink of milk before going out should be added to the diet.

About 1½ *pints of milk* should be taken in twenty-four hours, and for most children one pennyworth of cream in addition will be useful. The foods above mentioned must still provide the supplies; the breakfast should still consist of a cereal well boiled, eaten with cream and milk.

At Dinner the child should have, every day, potatoes well mashed in milk or gravy, or roasted apple pulped, or stewed prunes rubbed through a sieve, or a pounded-down banana. A little fish, whiting or sole, steamed and pounded, is very suitable, also breast of chicken boiled or roasted, moistened with chicken broth or bread sauce, or a little turkey, or breast of pheasant, can be allowed. A small quantity of beef or mutton from a roast, with plenty of gravy to a little mashed potato, may be given very occasionally.

Meat should not be given more than twice a week. It is advisable to plan the dinners so as to give soup three days in the week, fish two days, and possibly chicken or game another day, and the red meat on the remaining day. Meat may be entirely withheld without doing any harm until the child is two years old.

For Pudding, custard baked or boiled, curds with cream, well-cooked milk puddings, tapioca, farola, semolina, sago, bread crumb given with pulped fruit—for example, apple, prunes, banana, apricot—are the most suitable. Seedy fruits,

such as strawberries, raspberries, red and white currants, should be avoided.

Blancmange, flavoured with orange or lemon, or a meringue, gives variety to the puddings.

Mastication must be encouraged from the earliest time, and to this end toast and butter, rusks, and crisp rolls should always be available for the nursery. Bread and butter, plain biscuits, and sponge cake are allowable. Fruit cakes, new scones, cookies, buns, and pastry are injurious. A little jam, such as red currant jelly, gooseberry jelly, apricot jam, may be given (raspberry and currant not advisable).

A child should always be allowed a drink of *cold water* if it is thirsty. Many nurses and parents think it is injurious, but it will do no harm even in early infancy, and children should be encouraged to drink rather than the reverse.

X.

DIET AT DIFFERENT PERIODS OF LIFE.

Chapter X.

DIET AT DIFFERENT PERIODS OF LIFE.

CHILDHOOD, SCHOOL LIFE, MIDDLE LIFE, OLD AGE, PREGNANCY, LACTATION.

I. DIET DURING CHILDHOOD, FROM TWO TO SEVEN YEARS.

A COMMON fault in the feeding of children is giving a diet which consists too largely of soft food-stuffs, which require little or no mastication. Such food-stuffs are usually of a kind which lead to acid fermentation. Serious consequences follow this defective system of feeding. In the first place, the muscles of mastication and the jaws are imperfectly developed, with the result that the post-nasal space is small in size and liable to be further encroached upon by an excess of lymphoid tissue (adenoids), with resulting unfavourable effects on the growth and general nutrition of the child. Secondly, the starchy foods lodge round the teeth and undergo acid fermentation, with resulting dental caries. A first essential in the feeding of children, therefore, is to see that the food is of a nature that demands mastication. At each meal the child should receive one or other of the following articles of diet: baked bread (slice of ordinary bread placed

in a quick oven until it is quite dry and crisp), milk toast (thin slice of stale bread dipped in milk and baked in a slow oven until it is brown), unsweetened rusks, unsweetened biscuits, oatcakes, or unfired bread (Christian's, p. 244). After a meal which contains much carbohydrate in the form of cakes, or sweets, the acid in the mouth may advantageously be neutralized by the salts present in a little raw fruit, such as apples, bananas, or nuts.

From two years of age onwards the normal child has a well-developed digestive apparatus and a keen appetite, and is well able to digest most food-stuffs if given in moderation. The teeth by this time are through the gum, and it is of the greatest importance that the diet should be one which develops the art of mastication. The movement of the jaws in mastication in growing children promotes the development of the muscles of the tongue, palate, and naso-pharynx; it, at the same time, favours the normal development of the nasal and naso-pharyngeal cavities, which is of so great importance for the purpose of respiration and general nutrition. Too much importance, therefore, cannot be devoted to the question of a proper diet during this developing period.

The following table gives the average weights and heights of children at different ages. It should be borne in mind that these averages are calculated from tables of the weights and heights of a large number of persons, and though accurate as a general guide, are not necessarily true for each person. A deviation of fifteen per cent. in either direction from the standard is not seriously regarded. Of more importance than the actual weight is the proportion between height and weight. Care must be taken that the patients who are weighed periodically should always be weighed under precisely similar conditions as to scales, clothes, etc.

Males.			Females.		
Age last birthday.	Height.	Weight.	Age last birthday.	Height	Weight.
	ft. in.	st. lb.		ft. in.	st. lb.
1	2 5½	1 4½	1	2 3½	1 4
2	2 8½	2 4½	2	2 7	1 11¼
3	2 11	2 6	3	2 10	2 3½
4	3 1	2 9	4	3 0	2 8
5	3 4	2 12	5	3 3	2 11
6	3 7	3 2½	6	3 6	2 13¾
7	3 10	3 7¾	7	3 8	3 5½
8	3 11	3 13	8	3 10½	3 10
9	4 1¾	4 4½	9	4 0¾	3 13½
10	4 3¾	4 11½	10	4 3	4 6
11	4 5½	5 2	11	4 5	4 12
12	4 7	5 6¾	12	4 7½	5 6½
13	4 9	5 12½	13	4 9¾	6 3

The Food Requirements of Children.—The quantity of food required by children is out of proportion to their size and weight, for the following reasons: The rapid growth taking place requires muscle-forming protein material for the constructive processes; the incessant activity calls for an abundant supply of energy-producing food—carbohydrates and fat: the loss of heat in children is more rapid than in adults, and an abundant supply of heat-forming food is therefore necessary. The general principles of treatment are as follows:—

1. An abundant supply of protein, carbohydrate, and fat.
2. The meals to be given at regular hours, nothing being given in the interval.
3. The diet should be simple, nothing being necessary to tickle the palate or stimulate the appetite.
4. The diet should include a sufficient amount of hard food, so that the habit of proper mastication may be acquired.

5. Fluid should be taken at the end of meals, special care being taken that the fluid is not utilized to swill down imperfectly masticated food.

Proteins are best supplied in forms of milk, eggs, and the proteins in the various cereals and legumes. The proteins of red meat and white meat are very appetizing, and much relished by children, but they should be used sparingly. Fish, chicken, and rabbit are preferable to red meats. Meat soups thickened with various cereals and vegetables may be recommended.

Milk should be the great standby; in the feeding of children the allowance of one to two pints of milk daily, according to age, is not at all too much for a child. Some of this can be taken plain, some mixed with cocoa to make a hot drink, and the remainder used in the cooking of gruels, puddings, custards, etc.

Eggs are excellent for growing children; if given every day, a child tires of them, and in some children they cause "biliousness." Very occasionally children cannot take eggs.

Carbohydrates are mainly supplied in the form of bread in all its varieties, also by the different cereals, and by vegetables properly prepared.

Fats.—Cream, butter, bacon fat, dripping, suet, yolk of egg, are all forms in which fat can be presented to children in an appetizing form. Fat is a most important element in the food of children at this period of life. Cream and butter are excellent forms of administering fat to growing children. From one to three ounces of cream may be given daily, this being given in the form of creamy milk, or with puddings or stewed fruit. Bacon fat and marrow fat are excellent forms of fat administration. Recipes are given in ch. xxii.

Cereals.—Almost any kind of cereal may be given for

breakfast, and a sufficient variety should be given to prevent the child tiring of them. The following may be recommended: Oatmeal, whole-wheat flour, as wheaten groats or Artox, hominy, puffed rice; pease flour, lentil flour, maize flour, are also good.

Bread and **biscuits** form the staple method of administering carbohydrates. The bread should never be new. It should be given twice daily as dry, crisp toast, or as baked bread, as these promote mastication. The baker should be asked to supply bread made only from flour which has not been bleached. Dry, crisp rolls are also advisable. New scones and buns are not advisable, but on the second day are very good if toasted. These different bread foods promote mastication, if care be taken to see that the child is not allowed to swill them down with fluid. Plain biscuits should always be available, but rich sweet varieties should only occasionally be given. Plain sponge cake and biscuits are also allowable. All rich cakes with fruit, rich butter pastry, and heavily iced cakes should be withheld.

Vegetables may be given for dinner, such as plain boiled or mashed potatoes, plain boiled and well-cooked cauliflower, spinach, cabbage, or lettuce rubbed smoothly down and well boiled.

Broths and **Soups** should not be made too strong, or thickened with meat purée, but meat stock can be added to good vegetable soup made with carrots, turnips, onions, leeks, potatoes, lentils, peas. This may be thickened with barley, rice, tapioca, groats, sago, macaroni, yolk of egg, cream. A nourishing fish soup can be prepared and thickened by adding a purée of the fish.

Meat Foods.—Fish of the white varieties, boiled, broiled, and fried, are always allowable. Chicken and rabbit may be given twice a week. Beef and mutton boiled and roasted are

quite digestible, but it is generally advisable not to start with red meats until towards the end of this period.

Puddings should be taken once daily, the most suitable being custards, plain, baked, or boiled; milk puddings of different grains made with or without eggs; jelly (lemon or orange or other fresh fruit); curds with cream. Suet puddings are less digestible, and should certainly not be given frequently.

Fruits are good for children; the fresh juice contains properties which are good for the blood, and it contains sugar in an easily assimilated form. Some fruit should be taken daily. Of fresh fruits, oranges, apples, grapes, bananas may be taken, avoiding the skins and stones.

The Fresh Berries—raspberries, red and white currants, brambles, etc.—are best cooked and the juice eaten with a pudding. Strawberries should be given very sparingly, as in many children they disagree.

Stewed Fruit—apples, prunes, rhubarb, apricots, pears—may all be given as an agreeable change to the milk puddings.

Sugar.—The growing child demands sugar, and usually shows a great craving for it. It is best to supply this in the form of sweet pudding or stewed fruit. Honey, syrup, jam, eaten with bread and biscuits, are also good. A little good chocolate or pure, plain toffee drop can do no harm in moderation, but the indiscriminate partaking of confectionery is prejudicial to the teeth and to the general nutrition.

It will be convenient at this stage to indicate the special articles of food which may with advantage be withheld from children under seven years of age:—

Meats.—Sausage, pork, salted fish, corned beef, goose, kidney, liver, stewed meats.

Vegetables.—Fried vegetables of all varieties, raw or fried onions, raw celery, radishes, lettuce, cucumbers, beetroots.

Bread and Cakes.—All newly baked bread, rolls, scones, buns. All rice cakes containing dried fruits and thick icings.

Dessert.—Candies, pies, tarts, pastry of every description.

Drinks.—Tea, coffee, wine, beer, cider.

The following diet sheet is adapted for a child at this period of life. The actual amount of food-stuffs to be given will vary with the age and size of the patient:—

MEALS.

If child awake early (6 to 6.30 a.m.). Drink of milk; a piece of dry bread, or plain biscuit.

BREAKFAST (8 a.m.).—Milk to drink, or cocoa made with milk. A well-cooked cereal with salt and cream (no sugar or syrup). Toasted bread and butter (with crusts), a little jam.

This should be a sufficient breakfast for children up to seven years, but if more is found necessary it should not be more than an egg, boiled, poached, or scrambled, or a little fish. A little fresh fruit may be taken after breakfast or during the forenoon.

DINNER.—Milk to drink and toast to eat (with crusts); and a two-course dinner as follows. As the child gets older, soup and a more liberal supply of vegetables may be added.

1. Soup well thickened; milk pudding.
2. Eggs with a vegetable; junket.
3. Fish, potatoes; suet pudding.
4. Chicken or rabbit; stewed fruit.
5. Roast meat, potatoes; custard.

TEA.—Milk, or milk and cocoa; bread and butter, biscuits, plain scone, jam.

SUPPER.—Milk and toast and butter, or a cereal (for example, gruel), with some unfired bread (p. 244).

The child should be taught to eat slowly, and to chew the food well. In this connection attention may again be directed to the importance of such articles of diet as crusts of bread, crisp rolls, and the like being given daily, care being taken that the child chews the food and does not merely wash it down with fluid. The importance of this can hardly be overestimated. The quantity of food depends largely on the appetite of the child. The appetite should not be forced.

If the food is not all taken, it is well to wait until the next meal. Loss of appetite is often an indication that the digestive organs require a rest. This rule does not apply to sick children.

Diet for a "Delicate" Child.—There are two common and important causes of "delicacy" in children—namely, (1) the tuberculous tendency and (2) chronic indigestion from weakened state of digestive secretion. These will be separately referred to, also diet for child of gouty parents, and the nervous child.

The Delicate Child from Threatened Tuberculosis.—In families where there is a marked tendency to tuberculous disease, the question of diet is a highly important one, since much can be done to eradicate the tendency. The special feature about the diet in such cases is the necessity of an increased amount of animal protein food, and more especially meat or raw meat juice. The beneficial effects of a properly planned dietary in these cases are very remarkable. Needless to say, the appropriate diet must be continued for many months, or even for a year or two, if the best results are to be obtained. The following diet sheet is adapted for a child of five or six years of age with a strong hereditary tendency to tuberculosis.

Diet for a Child of Five Years, of Tuberculous Stock.—

This dietary contains a more liberal supply of animal proteins in the form of milk, eggs, meat, and soup than an ordinary diet, the diet including two pints of milk, and meat foods at least three times daily. This point should be insisted on and continued during the growing period.

Six-thirty a.m.—Milk; biscuit and butter.

Breakfast.—Milk; butter, bread, egg, fish, or bacon.

Lunch.—Cup of soup (meat stock), or egg flip.

Dinner.—Soup, with raw meat; curds and cream; glass of milk. Pounded meat and vegetable; stewed fruit cream; glass of milk. Fish, with sauce, potato; custard pudding; glass of milk. Chicken, bread sauce, vegetable; blancmange cream; glass of milk.

Tea.—Milk; bread and butter.

Supper.—Good meat soup, thickened with milk; or egg, or meat purée, or lentil purée.

The Delicate Child from Weak Digestion.—The clinical picture of a child suffering from chronic indigestion is a varied one. The child may be well nourished, but more commonly it shows wasting. Listlessness and a general physical and mental apathy are prominent features, and these are associated with loss of appetite, distaste for ordinary food, and often a distinct degree of anæmia. A derangement of the bowels is usually present, the bowels being constipated or loose, the motions being offensive and containing undigested food-stuffs. This condition arises from over-feeding or injudicious feeding of long duration. Too liberal indulgence in starchy foods, with excess of sweets and tea, are commonly noted causes; these cases are, indeed, frequently merely cases of starch indigestion. In the treatment, the whole digestive tract must get a rest by the administration of only small quantities of the most easily digested foods given in fluid form. The benefits of this treatment are often more quickly obtained by keeping the patient in bed for a few days, and clearing out the bowels thoroughly as a preliminary

measure. The diet at the outset should consist of peptonized whey, weak beef-tea, a weak mutton, veal, or chicken soup, given in 3- to 4-ounce feeds, with not more than a finger of crisp toast. Skimmed milk, chicken jelly, and meat juice are then added to the diet. Later, ordinary milk is given, and, if well tolerated, it may be fortified by white of egg, plasmon, protein, or sanatogen, and by the addition of simply prepared fish, chicken, or sweetbread. Starchy foods must be added very cautiously, beginning with crisp toast, rusk, or stale bread, and going on to a plain milk pudding or prepared invalid food — Savory and Moore's, Benger's, or "Allenburys." The administration of extract of malt or maltine is of value in aiding the digestion of carbohydrates, and much benefit is also obtained by administering 10 to 20 grains of bicarbonate of soda thrice daily between meals; the latter corrects the "acidity" present in these cases.

It will be found advantageous in these cases to restrict the diet for some time along the following lines, the carbohydrates and fats being specially curtailed.

Breakfast.—Skimmed milk; fish, ham, or tongue, stale bread, toast, or crisp roll with a little butter.

Dinner.—A bowl of clear soup; a good helping of fish, chicken, or meat, green vegetables (no potatoes); toast or rusk (no puddings); 6 ounces diluted milk.

Tea.—Cup of warm diluted milk with slice of toast, and dry biscuits (no cakes).

Supper.—Cup of beef-tea thickened with plasmon, and a rusk or slice of toast.

The above régime can be gradually added to by the addition of plasmon, or sanatogen, added twice or thrice daily to the milk or beef-tea; also by custard pudding, curds, fruit jelly, stewed fruit without added sugar, meringues; starchy foods may be resumed in the form of the invalid

foods given once daily—for example, for supper—after which a gradual return is made to plain ordinary food.

Diet for a "Gouty" Child.—In families where there is a marked gouty tendency, the diet of the children should be carefully regulated, since it is certain that with care much can be done to eradicate the tendency. The special points to observe are:—(1) The necessity of bringing up the child very largely on a lacto-vegetarian diet; red meats of all kinds should be withheld, or, at most, given very occasionally; and (2) Sugar and food-stuffs rich in sugar should be given sparingly. If the child is carefully dieted along these lines during the growing period, he will be much less prone to develop gouty symptoms in later life.

Diet for the "Nervous" Child.—Sleeplessness, night terrors, chorea, and a general state of mental irritability are characteristic of the nervous child. In such cases, and in all children where there is a family history of nervous disorders, careful regard must be paid to the diet. It must essentially be of a non-stimulating character; meats and meat foods must be withheld; milk, farinaceous foods, fruits, and vegetables forming the dietary. The diet should be of the lacto-vegetarian character described on p. 257.

II. DIET DURING SCHOOL LIFE.

During this stage of life the rapid growth and incessant activity still continue, and to this is now added the brain-work. It thus follows that growing boys and girls require a large amount of nourishing food.

If a child has been wisely brought up and has a duly proportioned amount of work and play and sleep, his appetite is the best guide to the amount of food required. The appetite of a child that has been pampered, and has not been brought

up on plain, wholesome food, is not a reliable guide to the amount of food required.

A very important point in the diet of young subjects is that of not starving the growing child in any one food-stuff. A requisite amount of proteins, fats, and carbohydrates is essential. To stint is very often to starve; therefore, in arranging the diet, the meals should be at regular intervals, three good meals being given daily. A due amount of consideration must be given to the whole diet. Abundance of milk, a fair supply of fresh meat, and a liberal amount of vegetables and fruits are the essentials in the dietary of this period. The question of hours is important. Breakfast should be punctual, to allow the child to have time to eat a good hearty meal, and have time before starting for school to get the bowels attended to. Day scholars are very often much upset through neglect of this wholesome rule. The meals should not be bolted, ample time being taken to effect proper mastication of the food. The following dietary may be recommended :—

The *breakfast* should be the heartiest meal of the day. Begin with a small plate of porridge and glass of milk ; this followed by an egg or fish, bread and butter, or toast and butter, and tea or coffee largely made with hot milk ; jam or marmalade and oatcake.

Eleven-thirty a.m.—The following snack may be given if breakfast is a very early meal : A dry biscuit and a drink of milk (not hot scones, buns, or pastry) ; a little fresh fruit—for example, apple, orange, or banana.

Dinner, in the middle of the day, should consist of soup, meat, vegetables, and pudding. The soup does not require to be made of rich meat stock—lentil, pea, broth, or rice soup are all excellent, giving a good foundation for the meat course. Meat : roast, boiled meat, and stews are the best, served always with potatoes and a vegetable. Pudding should be varied. Suet puddings with fruit or jam, milk puddings, or stewed fruit. A glass of milk may be given with this meal, and as much bread as the child wishes to take.

Tea should not be later than 5.30 p.m., to consist of—Beverage,

milk or cocoa (not tea as a rule); as much plain bread and toast as the child can eat, plain cake; sometimes an egg, or fish, or potted meat; marmalade, jam, or honey.

Under no circumstances should beer or other alcoholic liquors be given to boys at school.

III. DIET IN MIDDLE LIFE.

A young man in enjoyment of good health and leading an active outdoor life may, under the stimulus of appetite and of enjoyment in gratifying it, often exceed considerably in quantity and quality of food without apparent detriment to his general health. But as middle life approaches, if the same liberal régime is continued, the balance of unexpended nutriment soon tells more or less heavily against him; more especially if, as usually happens, the subject is leading an inactive life as regards muscular exercise. The neglect to adjust a due relation between the "income" as regards food and the "output" as regards energy and the state of the excretions cannot go on for an indefinite period without signs of mischief appearing in some quarter. If the subject is predisposed to corpulence the unemployed material in the food is stored up in the form of fat in the subcutaneous tissue and intestinal organs, and the owner is handicapped by a weight which makes active movement difficult and the respiration unduly embarrassed on exertion. Not one man in fifty lives to a good old age in this condition. Such a man must therefore select a diet that agrees with his "constitution" rather than one which simply agrees with his stomach, and if he would avoid an apron of fat with its attendant disadvantages he will restrict judiciously the fats and carbohydrates in the dietary (see ch. xix.). Obesity can almost invariably be controlled by a sound system of feeding. In other subjects the failure to adjust the balance

between intake and output is revealed by the occurrence of so-called bilious attacks, or recurring attacks of rheumatism or gout.

The gourmet endeavours to get rid of the accumulated excess of aliment in his system by various devices—for example, special exercises, Turkish baths, and annual visits to a spa. These admirable methods of treatment would be less frequently necessary if individuals realized that these diseases are merely the natural result of errors in feeding. It should be kept in mind that just as human brains differ vastly in power and activity, human stomachs show equal variations in their capacity and power to digest. The natural power to digest is small in some people, if judged by the standard requisite to digest the large excess of food that is often taken by some people in middle life and after. But this limitation, it should be noted, is not without its important compensation. A stomach which is relatively delicate as judged by this standard, and which can just do the needful work for the system and no more, is in reality a good friend to its owner, as it prevents the gross excesses in feeding, with their attendant serious evils, which are so well exemplified in the owner of the strong stomach, who appears for the time being to pay no penalty for his dietetic indiscretions.

We must keep in view the important consideration that although broad rules of diet may be laid down as applicable to different classes of people in general, no accurate application to the individual is possible without a knowledge of his daily habits as well as to some extent of his personal peculiarities. The amount of fresh air, the physical exercise indulged in, the amount of brain work undertaken, are all important factors requiring to be considered. A man engaged in hard manual labour requires as a rule about 40 per

cent. more nourishment than a man of equal size and weight leading an indoor, sedentary life. A light diet is of special value to brain workers. It does not require much force to digest, nor much muscular exercise to assimilate. Cereal foods, such as well-made breads in variety, and vegetable produce, including fruits, should form a large part of the diet, with the addition of eggs and milk, and little meat foods other than fish, fowl, and game. Red meats should not be taken more than once a day. For those engaged in a sedentary occupation, and more especially if much brain work is involved, the middle day meal can with advantage be selected from fruit, bread and cheese, and milk if desired. If afternoon tea is taken, it should be restricted to one or two cups of tea, with wafers of toast or light cake, but solid food is better withheld. The arrangement of meals will necessarily vary according to the work and social circumstances of the individual.

IV. DIET IN OLD AGE.

Diet in Old Age.—Increasing years are associated with diminishing activity and a lessening demand for energy. Less nourishment must therefore be taken in proportion as age advances, or the individual will suffer. If a man of sixty continues to take the same abundant breakfast, substantial lunch, and heavy dinner which he indulged in at the age of thirty or forty, serious illness will result. He may accumulate fat which will lead to serious heart mischief, or he may develop various symptoms of gout or rheumatism which will be in turn associated with evidence of kidney weakness and marked liability to apoplexy. The tissues in later life have less power to eliminate, and the excretory activity of the kidneys diminishes with increasing

years. The amount of food therefore consumed in old age must be proportionate to the lessened demand of the tissues, and to the diminished powers of elimination. The total intake of food must be reduced. For the same reasons a man of seventy requires less food than a man of sixty years of age, and an octogenarian less than a man of seventy. It is often difficult to get the relatives of an old man to believe that it is not advisable to "support" the weight of years by liberal feeding. The attempts to strengthen the old man by giving extra nourishment in the form of strong beef-teas, egg flips, and the like cannot be too strongly deprecated. Such liberal feeding merely goes to overcharge the blood with impurities, and to accelerate the decay of the tissues. Given a fair constitution, the use of a physiological diet in old age promotes a comfortable life, and is attended by a freedom from serious trouble which is of the greatest advantage both to the individual and to his relatives. It will be convenient to give the guiding rules for the dietetic management of a person of seventy years of age. Care has to be taken in the following directions:—

1. To restrict the total amount of food.
2. To make the diet simple and nutritious, avoiding excess of animal food.
3. To pay special attention to the form of administration of carbohydrates—old persons are specially prone to flatulence.

Diet.—The food should be given at short intervals, say *four* to *six* times in twenty-four hours; the diet should be simple; by this it is to be understood that not only is the quantity of food taken to be gradually diminished in proportion to decreased activity of body and mind, but that not more than two or three different forms of food should be

served at any one meal. There is no objection to variety in the choice of foods. All food must be in a form admitting of easy mastication.

Any system of diet must be varied according to the circumstances and personal idiosyncrasies of the individual, but the following arrangement of meals can be recommended. If the patient is markedly obese, the diet must be restricted and modified along the lines laid down for "Obesity" in ch. xix.

Six a.m.—Cup of tea freshly made ; nothing to be eaten with it.

Breakfast (*8.30 a.m.*)—A small cup of tea or coffee ; bread-stuff should not be hot rolls, or indigestible new bread ; eggs or fish cooked in various well-known ways.

Lunch (*1 or 1.30 p.m.*).—Fish and a farinaceous pudding, or fish and biscuits and cheese. It is, in most cases, better to reserve the meat or fowl to the evening meal.

Four p.m.—A cup of freshly made tea.

Dinner (*7 p.m.*).—Should generally commence with a little soup, a vegetable purée, or a good fish soup (*vide infra*). Many elderly subjects are better without soup. Fowl or game, red meat only occasionally, and one dish of vegetable pudding of a light, farinaceous variety, or stewed fruit.

Ten p.m.—A cup of good consommé, or beef-tea or chicken tea, with a thin slice of toasted bread, is a very good thing for old persons just as they get into bed.

Milk and Cream.—Cream is a capital substitute for other forms of fatty food, and should be taken with tea and pudding.

Milk, if it can be digested, should always form a part of the dietary of the aged ; the tendency should be to increase the amount of milk used as the vegetables and fruits are diminished. Milk is, of course, used in the cooking of gruels and farinaceous foods. As a beverage, milk can be taken with cocoa or coffee, or warmed and taken with a little saline or effervescing water.

Bread.—White or brown bread should always be toasted, and some forms of bread are found to be more digestible than others—for example, a "pan" loaf. The toast should be thoroughly toasted through, and quite brittle; two to three slices crisply toasted should be sufficient. Dry biscuits and rusks have also special value in the diet of the aged (see also p. 387).

Butter.—Fresh butter is the most wholesome of all fat foods, one ounce being taken in the twenty-four hours.

Soups.—The light forms of consommé, vegetable purées, and fish soup are all appreciated when taken in small quantity. Chicken, veal, and beef teas may all be used for the light supper meal at night. Rich animal purées, hare soup, kidney soup, ox-tail, and turtle all throw too much strain on the digestive glands and should be avoided.

Fish.—Fish is allowable for old people. The oily fishes —such as salmon, herring, mackerel—are the only ones that are apt to disagree, unless taken in small quantities. In addition to the usual methods of boiling, frying, and baking fish already described, a variety of dishes may be made from this class of food that are found to be appetizing as well as quite satisfying.

Meat Dishes.—Chicken and tongue are useful in the dietary of the aged.

Vegetables and Fruits.—Old people are very apt to give up vegetables, owing to their flatulent properties. This practice is not a good one, for, if persisted in, some minor symptoms of scurvy not infrequently develop. Everything depends on the form in which the vegetables are administered, and on the amount and nature of the other ingredients of the meal.

A small quantity of potato should be taken every day if possible, and also a certain amount of well cooked vege-

tables. Spinach, stewed lettuce, stewed or baked tomatoes, vegetable marrow, cucumber, boiled or stewed celery, sea-kale, asparagus, leeks, the flower of cauliflower, large Spanish onions, and French beans are all suitable. Uncooked vegetables as partaken of in salads are not very satisfactory, since they are apt to cause fermentation. The same holds good for cabbage, greens, brussels sprouts, turnips, parsnips, and old carrots. For methods of preparation of the vegetables see p. 385, and ch. xxii.

Fruit taken in small quantity is also permissible. It is best to take it cooked, either stewed or baked, and eaten with cream.

In stewing fruit, if cane sugar is added by the cook, the resultant product is very apt to turn acid. It is therefore better to neutralize the acidity with an alkali rather than to attempt to mask the flavour with sugar. Thus, to each pound of fruit add as much bicarbonate of soda as will lie on a shilling. The bitterness of the fruit will be gone, and the natural flavour of the fruit will become apparent, which is usually quite sweet enough. If this simple method be adopted, many old people will find that they can enjoy stewed fruit without the annoyance of acidity or heartburn. If there is a desire for sweetness, saccharin or saxin may take the place of sugar.

Liquids.—Very weak tea is generally best for breakfast, with a good proportion of milk and cream. This should be drunk at the conclusion of the meal. At lunch a cup of coffee and milk, or cocoa and milk, may be taken, or a glass of water may be taken after the meal is finished.

Stimulants in Old Age.—The question of the advisability or not of giving stimulants to old people depends largely on the previous habits of each individual. In the case of those who have not been accustomed to liquor in any form, no

advantage is to be gained by recommending it—they are better without it. For those who have been accustomed to indulge in a little wine or spirits, a small amount of alcohol may be advisable daily. This should be given with the chief meal of the day. A tablespoonful of whisky in a little water or table-water is probably the best form in which the stimulant may be administered. There is no reason why a glass of sound wine of any variety should not occasionally be taken in place of the whisky, but it is not advisable to take wine daily—this almost inevitably leads to manifestations of "rheumatism" or deranged digestion.

V. DIET DURING PREGNANCY.

Diet during Pregnancy.—A good mixed dietary is the one best adapted for the normal pregnant woman. If the bowels are kept regular, and if the patient takes the requisite amount of fresh air and exercise, no special dietary precautions are called for. Too much importance cannot be laid on the necessity of preventing constipation, and on the value of fresh air and exercise for the parturient woman. In many pregnant women, however, it is advisable to modify the diet. The necessity for this is shown by the presence of certain symptoms or physical signs in the patient which indicate the existense of a special strain on the kidneys and other organs of excretion. Thus, morning sickness in an exaggerated degree, albuminuria, and dropsy are serious symptoms in pregnancy, and their presence calls for very special attention being directed to the diet, which should be under the direction of the medical attendant. In these circumstances the lightest possible diet, one that throws the least strain on the kidneys and other glands, must be given. Such a régime is a milk diet. In severe cases it may

be necesssry to have recourse to an exclusive milk régime; in less severe cases, a diet of milk, bread, farinaceous foods, and fruits may suffice, while in the milder forms of derangement all that is necessary is that the patient should avoid red meats and rich dishes of all kinds, and live on the lacto-vegetarian diet described on p. 237. The quantity of nourishment must not exceed what is usually required by a healthy woman; the meals should be taken at regular intervals; and all indigestible articles of food, and any that are known to disagree with the patient, should be avoided. The morning sickness of pregnant women is not markedly affected by diet; small, simple meals at frequent intervals are the best.

In the later months it is necessary to take food in smaller quantities and more frequently, since over-distension of the stomach causes discomfort, owing to the size and position of the uterus. "Longings" for particular foods, so far as they are kept within reasonable bounds, may be gratified; but there is no evidence that the refusal to satisfy unreasonable caprices has any effect on the physical or mental development of the child.

Diet adopted to modify the Size of the Child.—The trend of modern thought, experience, and to a certain extent scientific research, tends to show that diet can to a certain extent modify the maternal and fœtal tissues in such a way as to make the labour more easy, and to increase the probability of a viable child being born. The consideration of this is beyond the scope of this work, and for it the reader is referred to the author's larger work.

VI. RULES FOR DIETARY DURING LACTATION.

The importance of sound health in the mother is very great. She must live a regular, well-ordered life—getting up in the morning for breakfast, going about the house, and taking exercise in the fresh air. She is in no sense an invalid, but has to remember that she is not free to do exactly as she likes. It is advisable that she should, whenever possible, have a daily rest for one and a half to two hours, to make up for the broken nights, and she should, while nursing, go to bed at a reasonable hour—ten or eleven o'clock.

The diet is very important. A mistake many people make is to take more food and more meals than are necessary. Feeding can easily be overdone, with the result that the infant's digestion is upset.

Three good meals a day should be the rule. At breakfast—in addition to the ordinary meal of tea or coffee, eggs, bacon, roll, toast, butter, and a preserve—take half a plate of well-made oatmeal porridge or gruel, with cream and half a pint of milk. Nothing further should be taken till the *lunch*, when a substantial two-course meal may be taken (the full children's dinner is generally sufficient).

For afternoon tea, take with the tea half a pint of milk.

For dinner, again, take a good meal (always consuming some red meat freshly cooked). If three or more courses are taken, milk is not required; but if meat and pudding only are taken, probably it will be as well to take a glass of milk.

Before going to bed a cup of weak cocoa and milk—Horlick's malted milk, hot milk, gruel, and milk should be taken. Many articles of food are condemned for nursing women, but really any food that does not give the mother

indigestion may be allowed. If the milk does not agree, the mother might try the "soured milk," and in other cases she may be able to continue the strain of nursing by taking some malt twice daily; for this homax may be recommended as being easily taken. The taking of beer, stout, porter, or wine is quite unnecessary and unadvisable.

XI.

VEGETARIANISM.

Chapter XI.

VEGETARIANISM.

OBJECTIONS TO VEGETARIANISM—SOURCE OF FOOD CONSTITUENTS — ADVANTAGES AND DISADVANTAGES OF VEGETARIANISM.

VEGETARIANISM is a term loosely applied to different varieties of restricted dietaries that have one point in common—namely, the exclusion of flesh foods from the diet. The *strict vegetarian* lives solely on vegetables grown above ground, and fruits. The *fruitarian or nutarian* lives on milk, fruits, nuts, and vegetables. The *purin free or uric acid free dietary* allows milk, cheese, cream, butter, white of eggs, vegetables, fruits, and cereal foods, but excludes tea, coffee, cocoa, yolk of egg, pulses, and flesh. The *lacto-vegetarian* diet allows certain animal foods—for example, milk and its products, eggs; also vegetables, pulses, cereals, fruits, sweets, tea, coffee, and cocoa. A variety of this vegetarian diet is one that is restricted to uncooked foodstuffs.

It is possible by restricting ourselves to a vegetarian diet to supply all the food elements—namely, proteins, fats, and carbohydrates—that are required by the body.

Vegetable foods differ widely, but as a rule they contain a much smaller amount of protein, a larger proportion of starch and sugar, and a smaller amount of fat than animal foods.

Some vegetable foods—for example, nuts—contain much fat. Proteins in a vegetarian diet are derived mainly from vegetables, milk, and eggs. Those derived from vegetables are more difficult to digest, and are on the whole less easily absorbed than those derived from animal food. It is advisable here to refer to the more important objections that are commonly raised to a system of vegetarianism, and to the data on which these are based.

OBJECTIONS TO VEGETARIANISM.

In the first place, it is generally urged that in a vegetarian diet the question of the intake of a sufficient proportion of nitrogenous foods is a practical difficulty; thus in the text-books it is stated that, owing to the composition of vegetable foods, in order to get the requisite amount of proteins in the diet, an amount of vegetable food-stuffs far in excess of body requirements has to be taken. In fairness to the advocates of vegetarianism it must be admitted that there is now little or no force in this argument. The advances in the knowledge of the construction of vegetarian dietaries in recent years have been very considerable; and by making use of the manufactured foods now available, it is certainly possible to frame an exclusive vegetarian régime, containing an adequate amount of proteins, fats, carbohydrates, and salts, in which there is no excess or bulk of vegetarian food-stuff. A second objection commonly raised must now be referred to. It is urged that there is evidence that the want of sufficient animal protein as opposed to vegetable protein in the dietary leads to disease. In answer to this it may be said that, so far as healthy individuals are concerned, provided the proper amount of protein is given, it does not materially matter whether it is derived from beef steak or from lentils. A third

objection still has to be dealt with—namely, the unappetizing nature of a vegetarian régime. There is much force in this objection. Animal protein is, to most people, much more appetizing than vegetable protein, and use and wont has led to the adoption of a mixed protein dietary. Since we have seen above that, provided the right amount of protein is taken, vegetable protein has no advantage over animal protein, there is no scientific reason for withholding animal protein food from healthy people who desire it. We will now give some practical details adapted for those who wish to adopt a vegetarian régime.

SOURCE OF FOOD CONSTITUENTS IN VEGETARIANISM.

Proteins.—The strict vegetarian and fruitarian has to have recourse to many artificially prepared products in order to get the necessary supply of proteins in a fairly concentrated form. Nuts and the pulses supply the proteins, and these furnish the vegetarian meat courses. The manufacture of nut meats has been one of the greatest developments in extending the vegetarian bill of fare. Every year sees a number of new and improved preparations put upon the market.

Mapleton (2 Dolphin Street, Ardwick, Manchester) prepares a variety of nut and other vegetable meat pastes, put up in glass moulds, almond nut meat, savoury nut meat; and they also make nut meat from walnut, white and brown almond (with or without pea nut), grated and blended with certain cereals. These preparations can be used to make cutlets, steamed shapes, etc.

Chapman (Health Food Stores, Eberle Street, Liverpool) makes five or six varieties of tasty and appetizing meats, put up in air-tight glass moulds. Lentose (vegetable brawn) and walnut meat are especially to be recommended. They are fully seasoned, and may be used hot or cold,

and are excellent when sliced and lightly fried, and served with tomato sauce or gravy. They cost 9d. or 10d. per lb. A book of recipes can be obtained from the makers.

The London Nut Food Company (465 Battersea Park Road, London) also supply several varieties—meatose, vegota, and nut vego; they have distinctive flavours and are suited to different tastes. The Food Reform nut meat is made chiefly from pine kernels; it is said to be hardly distinguishable from gelatine of veal.

Protose, maltose, nuttolene, made by the International Health Association, Legge Street, Birmingham, are also of a high standard. Protose has a distinct meaty flavour, and is very good in stews, pies, fritters, sandwiches, etc.; cost, 1s. per lb.

A pure *vegetable albumin*, roborat (Vegetarian Society, Deansgate, Manchester), is now obtainable, and claims to contain 94 per cent. albumin, and is tasteless. It is the protein of wheat extracted and concentrated, and is especially useful in invalid dietary, and in helping to enrich the food of those who are otherwise unable to take the necessary amount of food. It can be added to any food in powder form, or, better still, by dissolving it by cooking for a few minutes in water. It can also be obtained made up with cocoa or chocolate. Emprote is another concentrated vegetable protein manufactured from the proteins and salts of pure milk, wheat, and fruit. It is a valuable preparation, which may be added to all sorts of dishes to increase the otherwise low protein value of the diet. It is practically tasteless, and soluble. Vegetarians use plasmon in a similar way.

Vegetable extracts, exactly resembling the meat extracts in appearance, are useful for soups and gravies. They are mainly prepared from grain by special malting processes, and are wonderfully like the best meat extracts in flavour. These are: wintox and nutrogen (Winter's), making a soup very like beef-tea; carnos, made by the Carnos Company; and marmite, a vegetable food extract which lays claim to possess the same nutritive value as a well-prepared meat extract, and costs about 1s. 1d. for a four-ounce pot, prepared by Marmite Food Extract Company, Mincing Lane, London. Good vegetable soups in tins and cubes are also available, and are not expensive—for example, Heinz's tomato soup, Chiver's soups (lentil, tomato, haricot, and pea). Eustace Miles issues two varieties of dried blocks which make excellent soup when dissolved—namely, savoury protein soup and protein mulligatawny. These both contain a very large amount of vegetable protein, and quite suffice for an adequate meal.

Pulses.—The pulses may be used fresh or dried, whole and ground into flour; green peas, broad beans, French beans, cooked in the ordinary way, or served with poached or scrambled eggs, are excellent. The large variety of dried pulses are very nutritious—lentils, red or German peas split, dried green and giant green peas, can be used for soup, stews, or cutlets. Brown beans, haricot beans, and butter beans, midget butter beans, are used in a similar manner. Vegetable soups made with any of the pulses are excellent; German lentils and brown beans produce a very good brown soup.

The **Animal Fats** are replaced by oil from nuts, and these are largely used by vegetarians for table butter and for cooking purposes. There are now a number of first-rate fats to suit different tastes and purposes, some having very much the appearance and consistency of lard, others closely resembling prepared suet, while yet others are not unlike dairy butter. These are used for frying, for suet puddings, for pastry, and for table use. One most like dairy butter is Mapleton's butter, sent out in two qualities, table and cooking qualities. Albene is a hard white fat, and serves all the purposes for which lard and dripping are used. Cocoa-nut butter, of the London Nut Food Company, can also be used for cooking. Pine kernels and vegsu are good substitutes for suet. Most of these fats are put up in 1 and 2 lb. tins, and cost about 8d. or 9d. per pound.

The **Nut Cream Butters** retain the nut flavour. Mapleton's walnut cream butter and almond cream butter are generally liked. The nut butter of the International Health Association is made from cooked nuts only, and may be used in soups and stews for thickening, or when diluted forms a nut milk. The same firm also prepares an almond butter for

table use which is specially adapted for those with weak digestions.*

The **Cereals** are largely used by vegetarians for porridge; and, in addition to the well-known oatmeal, Quaker oats, and barley meal, one may mention artox flour, a whole wheat meal which makes most excellent porridge, as well as scones and pastry. Banana oats is a recent preparation, and is appetizing to some palates; it is easily prepared, and is put up in 3d. packets, with directions. Banana flour is like rice flour, and is useful for puddings. Robinson's patent groats, Manhu whole-meal flour, and pure malted barley meal also all make excellent porridge. Kornules is another good grain food; it is a pure wheat product in granular form, and is ready cooked, and so can be used to prepare a hasty meal. Grape nuts are also a favourite dish with many vegetarians.

The so-called breakfast foods consist generally of cereals alone, and are predigested, and so heated as to be easy of digestion. Shredded wheat biscuits, granose flakes, toasted wheat flakes, Ralston's Food and avenola, are combinations of cooked grains, and make excellent porridge; all are satisfactory foods. Nut cream rolls and nut cream biscuits are made from whole meal, or treated with nut butter, and are other forms in which cereals are utilized in the dietary of vegetarians.

Fruitarian Cakes are also useful adjuncts to the vegetarian. There are many varieties, but they are alike in being composed of uncooked fruits and nuts, freed from stones and skins, but otherwise in their natural state. They are compressed into small cakes or slabs. Pitman Company, Bir-

* Nut kernels may also be used freshly ground in a small nut mill, and used as an addition to fruit and vegetable salads and in the making of sandwiches.

mingham, prepares about one and a half dozen varieties of these cakes, and will supply 12 cakes for 8d. They prepare a cyclist's luncheon for 6d., consisting of fruitarian cake and banana biscuits. The London Nut Food Company have several dainty fruit and nut cakes covered with chocolate. Mapleton, Manchester, have a large number of cakes; pear, with walnut and apricot, may be specially recommended.

Gelatine.—In the dietary of the vegetarian, gelatine is replaced by agar-agar, a product derived from a Japanese seaweed. (Chapman, Liverpool, prepares table jellies made from this.)

Beverages.—Tea, coffee, cocoa, and chocolate are all permissible to the vegetarian; but to avoid the stimulating effects of the xanthin in tea and coffee, many vegetarians take some of the *cereal coffees* now obtainable. These strongly resemble coffee in appearance and flavour, are refreshing, and free from caffeine. They are prepared by a roasting and grinding process from various grains—for example, postum, prepared by the Grape Nut Company; caramel cereal, prepared by Mapleton, Manchester. These, while similar in nature and composition, differ somewhat in flavour, so that various tastes can be suited. They can be prepared as ordinary coffee, but are the better of a few minutes' boiling. Banana coffee is a pleasant beverage, with a flavour not unlike that of ordinary coffee.

Vegetarian Cheese is made from nut milk, and is practically identical with ordinary soft cream cheese. Recipes for vegetarian soups, farinaceous foods, savouries, and egg dishes will be found in ch. xxii.

Lacto-Vegetarian Diet: Uncooked Foods.—Brief mention may here be made of a system of dietary of a largely vegetarian character, of which the distinctive feature is the use of uncooked food. The advocates of this system, first intro-

duced by Christian, believe that the vital principles of food are affected by cooking, and they give effect to this belief in practice. The diet consists largely of fruits, nuts, and especially Christian's protein nuts, pine kernels specially treated; also milk, raw eggs, uncooked vegetables, and a specially unfired bread made from a mixture of grains pressed, and some cereals. The distinctive feature of this dietary is the necessity of thorough mastication; in this respect the diet will certainly satisfy the most ardent disciple of Fletcher. The author has had the interesting experience of partaking of an "uncooked dinner," prepared by an expert in this system of feeding, and it is certainly surprising to find that a palatable and very sustaining menu can readily be prepared. A rigid diet of this nature is not a practical one, however, except for an enthusiast. There are certainly two points in its favour—(1) the absolute necessity of mastication, and (2) the possible advantages associated with the presence of vital principles unaltered by cooking; there is no doubt that a little of this system could with advantage be introduced into ordinary dietaries both in health and disease. A word of special commendation may be paid to the unfired bread, which is an excellent preparation.

ADVANTAGES AND DISADVANTAGES OF VEGETARIANISM.

Probably the greatest advantages which accrue from the adoption of a vegetarian régime lie in the fact that such a dietary is a most valuable corrective of over-eating. There is no doubt that the vegetable food-stuffs are less appetizing than animal foods, and accordingly the vegetarian feeder is less exposed to over-indulgence, with its attendant unfavourable

results. The system of diet adopted by the strict vegetarian and fruitarian is not to be commended; the lacto-vegetarian régime, on the other hand, is a most useful form of diet therapy in many diseased states. Its value is none the less pronounced because its beneficial effects may be, in many cases, to a material extent dependent on its negative property of ensuring moderation in feeding.

Such a diet has special advantages in the upbringing of the children of typically gouty parents; it is also most useful in the treatment of many disorders of the renal, cardiac, and vascular systems. Its use tends to lower blood-pressure and diminishes the strain on certain important glandular organs intimately concerned in the processes of general nutritious excretion—notably the kidneys and thyroid gland. Its long-continued use in certain cases also influences favourably the secretion of mucin from the glands in various mucous membranes, and hence it is of value in chronic catarrh of the mucous membranes—notably the nose, bronchial tubes, and uterus (dysmenorrhœa and menorrhagia). It is also useful in some forms of rheumatism, gout, and chronic nervous disorders, provided due attention is paid to the quantity and quality of the vegetarian foods, so as to prevent abnormal fermentation processes. On the other hand, we must recognize that there are not a few cases met with in practice in which patients have either dieted themselves, or taken on medical advice a more or less rigid vegetarian diet, to the serious detriment of their general health, and a corresponding aggravation of their disease. Some more or less strict vegetarian diets occasionally used, including nuts, are difficult of digestion, and therefore of poor nutritive value; and occasionally they profoundly derange primary digestion, inducing diarrhœa or constipation, anæmia, and profound disturbance of general health. Reviewing the

subject as a whole, it may be said that in healthy subjects, and more especially young subjects under forty years of age, a lacto-vegetarian diet has no advantages over the more conventional mixed dietary, taken in equal moderation and submitted to the process of thorough mastication; in later life, however, in health it is a wise rule gradually to more and more restrict the rich animal protein foods, and approximate to a lacto-vegetarian régime; and in the diseased states referred to, the therapeutic advantages of a carefully planned more or less strict lacto-vegetarian diet are very great indeed.

XII.

NUTRITIOUS MEALS AT SMALL COST.

CHEAP AND NUTRITIOUS TWO-COURSE DINNERS FOR FAMILY OF SEVEN.

Homely Measures.

Soup with Pudding.

Vegetarian Dinners.

Fish Dinner.

Meat Dinners.

NOURISHING AND ECONOMICAL ONE-COURSE DINNERS.

Chapter XII.

NUTRITIOUS MEALS AT SMALL COST.

Cheap and Nutritious Two-course Dinners—Nourishing and Economical One-course Dinners.

The question of supplying diets which are both cheap and nourishing is a very important one. To a man and his wife with three or four children and an income of £1 a week, or less, the question of how best to expend the sum required for the necessary food-stuffs is, or ought to be, a very vital one. There is, unfortunately, no doubt that inadequate attention is paid to this point, with the result that not a little of the malnutrition seen in the children of the poorer classes at the present time is due to *ignorance rather than to actual poverty*. This is very clearly brought out by the recently issued report for 1910 of Sir George Newman, Chief Medical Officer of the Board of Education. This report not only discloses the fact that a very large proportion of the children under the care of the Board are suffering from diseased conditions of various kinds, all of which are calculated to interfere with the conduct of education, and many with the ultimate attainment of sound physical development; but it discloses what is more important still—the fact that a considerable percentage of children are also *suffering from a greater or less degree of malnutrition*. In plain English, they are half starved. The report leads to the conclusion that it is too widely diffused to

be attributable to poverty in more than a small proportion of cases; a more probable explanation seems that afforded by the extraordinary ignorance of English women of the industrial classes concerning food values, cooking, and general economy of dietetics. Passing from malnutrition and disease, the report indicates that 40 per cent. of children in schools suffer from decay of the teeth—a fact that may be regarded as of equal importance to the health and fitness of the next generation as the prevention of tuberculosis.

Further, additional interest and importance now attaches to the subject of cheap and nutritious foods in view of the Provision of Meals Act, 1906, which empowers educational authorities to supply school children with meals, the cost of which is met out of the rates, or in part by voluntary subscriptions. Some idea of the extent to which this power has been exercised will be learned from the fact that in 1909–10 the cost to the rates of the meals so provided by the Education Board was £134,105. As the principles to be observed in the feeding of a family of six or seven, where the income is a very small one, are similar to those applicable when a large number of children have to be fed out of the rates, it is possible to gain information of value for the family from the results of the experience recorded in the past year or two by various educational authorities. These will be referred to shortly. It may be laid down that the essentials to be considered are the following:—

1. The food must be nourishing and ample in amount.
2. The food must be as cheap as possible consistent with 1.
3. The food must be of a nature that can be readily cooked with the limited facilities available in a one or two roomed house.
4. In children, satisfactory rate of growth, increased vigour, and more efficient education must result.

The most useful, cheap, and nutritious foods may be tabulated as follows :—

Proteins.	*Fats.*	*Carbohydrates.*
Peas. Lentils. Beans. Oatmeal. Macaroni. Meat (cheaper cuts). Liver. Skimmed milk. Herring, ling, haddock.	Margarine. Cheese (cheaper varieties).	Bread and bread foods. Potatoes. Jam. Treacle.

The relative nutritive value of the chief of these foods may be shortly stated :—

	Proteins.	Fats.	Carbo-hydrates.
Peas (dry)	22.6	1.7	53.2
Beans	23.1	2.2	53.6
Lentils	24.8	1.8	54.7
Oatmeal	10.9	4.5	59.1
Bread	6.5	1.0	51.5
Potatoes	1.2	19.1	...
Meat	21.0	1.5	...

A study of the above table shows that peas, beans, lentils, and oatmeal are, in virtue of the large amount of all three chief food ingredients present, highly nourishing foods, and they have the extra merit of cheapness. For example, a bowl of thick lentil soup, containing a quarter of a pound of lentils, with a slice of bread, costing about three farthings, contains much more nourishment than half a pound of meat and a slice of bread, costing about fourpence.

An illustrative cheap system of dietaries is here given :—

Breakfast.—

Porridge and skimmed milk.

Dinner.—Selected from the following :—

Soups from (1) Peas, beans, or lentils.

(2) Sheep's head, flavoured with rice, or barley, or vegetables.

(3) Fish soup, made from cod's head or trimmings.

Meat course selected from :—

(1) Liver, tripe, neck of foreign meat, mince made up with bread crumbs and potatoes.

(2) Fish, either haddock fried in batter, haggis with potato, ling or John Dory fried in batter or made into fish-and-potato pie.

(3) Bread with skimmed milk, margarine or dripping toast, cheap skimmed milk cheese.

Supper.—Selected from :—

Bread and butter, or porridge and skimmed milk.

The most important meal of the day is the dinner meal. In the case of very necessitous children it is possible to give, if necessary, at least one-half of the total daily food value required at this meal. This may be given in the form of a two-course dinner or a one-course meal. An excellent series of two-course dinners was worked out in detail in 1907 by Dr. Ralph Crowley in conjunction with Miss Marion Cuff for the City of Bradford Education Committee. Their report gave details of seventeen suggested two-course dinners, of which about one-half contain meat, adapted for a family of seven—father and mother and five children of average age of ten years—the cost of food material (in 1907) ranging from 1.1d. to 2½d. per head. The average food value of these dinners in protein and fat is as follows :—

Protein.	*Fat.*
29 grams (1 oz.).	18 grams ($\frac{3}{5}$ oz.).

Six of these dietaries are here given, in full detail :—

CHEAP AND NUTRITIOUS TWO-COURSE DINNERS FOR FAMILY OF SEVEN.

Cost ranging from 1.1d. *to* 2½d. *per head.*

		Cost—s.	d.
1.	Soup and pudding		9
2.	Yorkshire cheese pudding, gravy ...		11
3.	Cheese and lentil savoury, pudding ...	1	1
4.	Fish dinner, pudding	1	5
5.	Meat dinner, pudding	1	5
6.	" "	1	7

The quantities stated in the recipes would be ample for a good dinner meal for a family consisting of father, mother, and five children, the average age of the children being about ten years. The following notes on homely measures may be useful :—

Homely Measures.

When no scales or weights or measures are at hand, it is useful to know the proportions of flour, sugar, rice, sago, currants, sultanas, etc.

One slightly rounded teaspoonful	=	¼ oz.
" " " dessert-spoonful	=	½ "
" " " tablespoonful	=	1 "
One flat teacupful	=	¼ lb.
One flat breakfast-cupful or half-pint basin ...	=	½ "
Bread crumbs : two flat tablespoonfuls	=	1 oz.
Golden syrup or jam : one tablespoonful	=	2 "
Butter or other fat : one tablespoonful	=	1 "
" " a piece about size of a hen's egg	=	1½ "

In mixing liquids :—

One teacupful	=	¼ pt.
One breakfast-cupful or tumbler	=	½ "

The cost of the dinners is worked out from the foods costing the following retail rate :—

Baking powder	8d. lb.	Lentils	2½d. lb.
Cabbage	1½d. ea.	Margarine ...	4d. „
Carrots	1d. „	Meat (free from bone)	6d. „
Cheese	7d. lb.	Milk	1½d. pt.
Cornflour ...	6d. „	Milk powder ...	5d. lb.
Currants	4d. „	Nutter suet ...	7½d. „
Eggs	16 for 1s.	Oatmeal	2d. „
Fish	4d. lb.	Onions	1d. „
Flour (seconds)	1s. 5d. st.	Pearl barley ...	2d. „
Flour (whole meal)	1s. 7d. „	Peas, dried ...	2d. „
Fruit (in season)	2d. lb.	Potatoes	9d. st.
Ginger powder	1s. 2d. „	Rice	2d. lb.
Golden syrup ...	2¾d. „	Sugar	2¾d. „
Haricot beans (brown and white)	2d. „	Sultanas	6d. „
Jam	3½d. „	Tea	1s. 4d. „
Lemons	1d. ea.	Turnip	¼d. „

1. **Soup with Pudding.**—Brown haricot soup; dumplings; bread; baked jam roll. Total cost about 9d., or 1¼d. per head.

Brown Haricot Soup.

1 lb. brown beans.
½ lb. onions.
¼ lb. carrots.
¼ lb. milk powder (from skimmed milk).
1½ oz. flour.
Flavouring to taste (see note below).
Pepper and salt.
4 pints water.

Method.—Soak the beans overnight, then wash and put them in a pan with water, and bring to the boil. If possible, pass them through a sieve and return them to the pan. Add the carrots and onions, cut small, and cook until all are tender. Half an hour before serving add the suet dumplings (see below). A few minutes before serving add the milk

powder and flavourings. Mix the flour with a little cold water to a smooth paste, and add it to the soup. Stir quickly until it boils. Boil three minutes longer; season and serve.

Note.—The milk powder is added to increase the value of the soup. That obtained from full cream milk can be used for puddings and in tea. It keeps better than condensed milk. Ketchup, or Yorkshire relish, or celery salt may be used alone or in combination. They greatly improve the flavour.

Suet Dumplings.

6 oz. flour.	½ teaspoonful salt.
½ teaspoonful baking powder.	3 oz. suet (nutter or beef).

Method.—Mix the flour, baking powder, and salt; rub in the suet; mix with water to a stiff paste. Divide into equal pieces, shape into balls, and add them to the soup for thirty to forty minutes before serving.

Baked Jam Roll.

¾ lb. flour.	¼ teaspoonful salt.
¾ teaspoonful baking powder.	6 oz. margarine.
1 teaspoonful castor sugar.	Water to mix.

2 oz. jam.

Method.—Mix the dry ingredients, and rub in the fat. Mix with water to a stiff paste, and roll out once only. Spread the centre of the paste with jam, and fold over two or three times. Place in a greased tin; bake in a quick oven for about twenty minutes.

(The pastry looks much nicer if brushed over with milk and lightly sprinkled with castor sugar before baking.)

2. **Vegetarian Dinner** (*a*).—Yorkshire cheese pudding, with bean gravy; buttered rice; bread. Total cost, 11d., or 1½d. per head.

Yorkshire Cheese Pudding and Gravy.

1 pint milk.	½ lb. flour.
2 eggs.	½ lb. cheese.
Salt.	Margarine or dripping for the tin.

Method.—Mix the flour and salt. Break and add the eggs one at a time. Gradually add half the milk, stirring steadily; beat well. Add

the rest of the milk, and allow it to stand. Grate the cheese and add it to the batter. Pour the batter into a tin or pie-dish containing the hot fat, and bake in a hot oven from thirty to forty minutes until set.

FOR THE BEAN GRAVY.

4 oz. brown beans.	Yorkshire relish (to flavour).
A small onion.	Celery salt, pepper and salt to taste.
Bit of carrot.	$1\frac{1}{2}$ pints of water.

BUTTERED RICE.

6 oz. rice.	2 oz. margarine.
2 oz. sugar.	A little salt.

Water to boil.

Method.—To a saucepan of boiling water add one teaspoonful of salt to rice; boil quickly without the lid until tender. Strain off the water (keep it for soup or gravy); add the margarine and sugar, and serve very hot.

3. **Vegetarian Dinner** (*b*).—Cheese and lentil savoury, with bean gravy; bread; milk pudding and stewed fruit. Total cost, 1s. 1d., or $1\frac{1}{4}$d. per head.

CHEESE AND LENTIL SAVOURY.

$\frac{1}{2}$ lb. cheese.	$5\frac{1}{2}$ oz. lentils.
3 oz. bread crumbs.	$1\frac{1}{2}$ oz. margarine.
4 oz. onions.	Parsley, pepper, and salt.

Method.—Wash and pick over the lentils; peel and chop the onions; cook them in a little water with the lentils, stirring frequently. Grate the cheese, put in a basin with the partly cooked lentils and onions, add the bread crumbs, pepper and salt to taste, and about one tablespoonful of finely chopped parsley. Moisten with bean gravy (recipe, see above), and mix all to a soft paste. Put the mixture in a greased tin or pie-dish; place the fat in small pieces over the top, and bake in a hot oven until firmly set and a good brown colour. Serve hot with bean gravy.

MILK PUDDING.

2 pints milk.	2 oz. sugar.
4 oz. rice.	A little grated nutmeg or lemon.

Method.—The pudding may be boiled or baked.

Boiled.—If a double saucepan is available, put boiling water in the under part of the pan; put the milk, rice, sugar, and flavouring into the upper pan, and cook until soft and creamy. Serve with stewed fruit or jam.

Baked.—Put the milk, rice, and sugar into a pie-dish, grate nutmeg over the top, and cook for a long time in a very slow oven.

Notes.—(*a*) If skimmed milk is used, fat should be added to the pudding to replace the lost cream. (*b*) Instead of rice the following can be used in the same proportions—semolina, ground rice, sago, or tapioca. (*c*) If lemon rind is used for *flavouring*, cut in very thin slices. Cloves, bay leaves, or vanilla can be used.

STEWED FRUIT.

One and a half pounds of rhubarb, or any fruit in season that is cheap.

Method.—Put the water and sugar on to boil, wash the fruit and add to the syrup. Simmer very gently until tender, and remove the pan from the fire before the fruit breaks up. Lemon rind improves rhubarb and apples. Cloves may be put with stewed apples.

Dried fruit, as figs or prunes, should be well washed, then soaked in water overnight. Use the water for making the syrup.

The amount of sugar and water required will vary according to the fruit used.

4. **Fish Dinner.**—Fish-and-potato pie; bread; green peas; lemon sauce; blancmange and jam. Total cost, 1s. 5d., or 2¼d. per head.

FISH-AND-POTATO PIE.

2 lbs. fish (without bone).	½ oz. margarine.
3 lbs. potatoes.	½ tablespoonful chopped parsley.
Pepper and salt.	Lemon sauce.

Method.—Peel and cook the potatoes; steam or gently boil the fish and break it up into small pieces, removing any bone that may have been left in it. Put into a basin, and mix with some of the sauce into a soft paste; season well and add the parsley. Put the hot potatoes into a deep bowl and mash them thoroughly, adding a little milk and margarine, also pepper and salt. Put the fish mixture into a pie-dish, and place small pieces of fat over the top. Bake in a hot oven to a golden brown. Serve with the rest of the lemon sauce and the green peas.

Lemon Sauce.

2 oz. margarine.
2 oz. flour.
Half the juice of a lemon.
½ pint of water that the fish was cooked in.
Pepper and salt.
½ pint of milk.

Method.—Melt the margarine in a pan, and add the flour; blend them together, but do not allow to brown. Heat the milk and water (or fish stock) and add to the flour and fat, stirring quickly. Stir until it boils, and boil for three minutes; add seasoning to taste and the juice of half a lemon. Use some of the sauce to mix with the fish, and serve the remainder with the pie.

Green Peas.

¾ lb. dried green peas.
1 oz. castor sugar.
½ oz. baking soda.
½ oz. margarine.
Water to boil, and a sprig of mint.
Pepper and salt.

Method.—Soak the peas overnight in water to which half the soda (dissolved) has been added. Wash them and boil gently until tender in water with the rest of the soda, adding the sugar and mint. Take off the skins which rise during cooking; strain off the water. Add the margarine and seasoning, and eat hot.

Blancmange and Jam.

1¼ pints milk.
1 oz. sugar.
4 oz. jam.
2 oz. cornflour.
A few drops essence of almonds, or lemon juice.

Method.—Mix the cornflour and sugar with a little cold milk to a smooth, creamy paste. Heat the rest of the milk and add it to the cornflour, stirring quickly. Return all to the pan and stir until it boils; *allow it to boil for three minutes*, add the flavouring, then pour into a wet basin or mould. Turn out when cold, and serve with the jam.

5. **Meat Dinner** (*a*).—Hashed beef and gravy; savoury balls; boiled rice—as a vegetable; stewed fruit. Total cost, 1s. 5d., or 2¼d. per head.

Hashed Beef.

1½ lbs. beef (without bone).
½ lb. carrot.
1½ pints water.
Pepper and salt.
¾ lb. onions.
½ lb. turnip.
1 oz. flour.
Gravy.

Method.—Cut the meat in small pieces, put it in a pan with cold water and a little salt, and bring slowly to the boil. Peel and slice the vegetables, and add them to the pan. Cook all very gently together until tender; do not allow it to boil fast. Add the savoury balls (see below) about half an hour before serving. Mix the flour with a little cold water, and add to the stew to slightly thicken the gravy. Season to taste and serve hot, the rice being served as a vegetable.

Savoury Balls.

3 oz. flour.
3 oz. bread-crumbs.
Sweet herbs and parsley.
½ teaspoonful baking powder.
2 oz. nutter suet.
Pepper and salt to taste.
A little water to mix.

Method.—Mix the flour and baking powder; shred and rub in the suet. Add the bread crumbs, sweet herbs, chopped parsley, and seasoning. Mix with water to a stiff paste. Divide into equal portions, and shape into balls. Cook in the stew from twenty to thirty minutes.

(A well-beaten egg added to the water for mixing will enrich the balls. This is not reckoned in the cost.)

Boiled Rice.

6 oz. rice, salt, boiling water.

Method.—Have a pan of boiling water, add a dessert-spoonful of salt. Sprinkle in the rice, and keep it boiling quickly without the lid for eight to ten minutes. Then test it, and if not tender continue to cook until there is no hard centre in the grains of rice. Strain and dry well before serving. (Allow time for thoroughly drying the rice before serving. The grains should be well cooked, but separate.)

Do not throw away the water in which the rice has been boiled; it contains nourishment, and is good for making soup or gravy.

6. **Meat Dinner** (*b*).—Meat-and-potato pie; bread; milk pudding and stewed fruit. Total cost about 1s. 7d., or 2¾d. per head.

Meat-and-Potato Pie.

1½ lbs. beef (without bone).
½ lb. onions.
1 oz. flour.
Pepper and salt.
3 lbs. potatoes.
1¼ pints water.
1 oz. margarine.
A little milk.

Method.—Peel and cook the potatoes. Cut the meat in pieces, and put it in a pan with water and a little salt; bring slowly to the boil. Cook gently for ten minutes; then take out the meat, chop it finely or pass through mincing machine. Peel and chop the onions, add them to the meat, also the pepper and salt and some gravy. Mix all together and place in a pie-dish. Turn the potatoes into a basin, mash them well, adding a little margarine or dripping, some milk, and seasoning. Place in the pie-dish, over the meat. Stroke over with a fork, and place the rest of the fat in small pieces over the top. Put the pie in a hot oven to cook a golden brown. Make a gravy to serve with the pie. (This is a good way of using scraps of cold meat and cooked potatoes.)

These meals are perhaps better adapted for families with an income of 25s. weekly and upwards, as, in addition to the expense, the trouble involved in their cooking is in many instances beyond the facilities available in the restricted house and firing accommodation of the very poor.

Before leaving the subject of nutritive and economical *two-course dinners*, a word of caution should be added. When a two-course dinner consisting of soup and pudding is relied on as an ample meal, especially for children, care must be taken to see that the proper amount of nourishing food is given in each course. The author recently analyzed three two-course dinners which were supposed to be planned on the Bradford system (*protein*, 29 *grams; fat*, 18 *grams*); analysis showed that the nutritive value of the meals was low, the composition of the meals being as follows:—

Proteins.	*Fats.*
20.6 grams.	1.8 grams.

The deficiency was accounted for by the soup being too "thin," the puddings also being deficient in nutritive value.

NOURISHING AND ECONOMICAL ONE-COURSE DINNERS.

The question of a good one-course dinner is an important one. In many of the houses of the poor the cooking facilities—one small open grate—are not well adapted for providing a two-course meal if such were otherwise available; and in connection with the feeding of large numbers of school children there is certainly economy of time and labour, and possibly of expense, in a one-course as compared with a two-course meal. Experience has shown that a one-course meal at low cost can be made as nourishing and attractive to children as a two-course régime at the same outlay. It is of interest in this connection to refer to the nutritive value and cost of a series of five one-course dinners recently supplied, on my recommendation, by the Edinburgh School Board. A detailed statement is of value, as it enables the reader to see the advantages and defects of each of the dietaries. The nutritive value of the food was determined by analyzing the total amount of food taken by the "average" child in a school in one of the poorer districts of Edinburgh. I am aware that in the strict sense there is no such thing as an "average" child, just as there can be no "average" family; but still it is possible to establish what may prove at any rate a useful standard which may be practically applied. Any such standard must, of course, be applied intelligently, due allowance being made for those conditions of the concrete problem which differ from those which were presupposed in fixing the standard. The meals in question were, with the possible exception of No. 5, greatly enjoyed by the children. Analysis of the five meals gave the following

results, the meals and the figures for cost being kindly given by the officials of the Board.

EDINBURGH SCHOOL BOARD ONE-COURSE DINNERS.

	Protein.	Fat.	Carbo-hydrate.	Cost per head.
				£ s. d.
1. Lentil soup	29.5	3.7	112.6	0 0 0¾
2. Meat soup and potatoes ..	18.5	9.4	67.2	0 0 1¼
3. Plum pudding	36.4	20.2	151.4	0 0 1½
4. Scotch broth	28.2	8.1	71.0	0 0 1
5. Porridge and hard biscuit ..	24.5	4.1	105.3	0 0 0¾
Average	27.1	9.0	102	1.2d. (per hd.)

A study of the figures in the different columns is very instructive. The average amount of proteins, 27.1 grams, fat, 9.0 grams, and carbohydrates, 102 grams, may be taken as a reliable standard for a highly nutritious material, erring, if anything, in a deficiency in fat. If we compare the individual menus, we find that

No. 1 is a very nourishing dinner, obtained at small cost.

No. 2 is of considerably lower nutritive value, and is out of proportion expensive.

No. 3 is a rich, highly nourishing meal, and is proportionately dear; it is only advisable as an occasional meal.

No. 4 is a good dinner, obtained at moderate cost.

No. 5 is also a good meal, a little below the average in nutritive value; this can be rectified by slightly increasing the amount of milk.

A highly nutritious, cheap, and palatable day's menu may be summarized as follows. When calculated for a family of father, mother, and five children the price works out at 15s. 6d.

per week, which may be regarded as the minimum rate at which a family of that size can be adequately fed.

		Protein.	Fat.	Cost.
BREAKFAST—Porridge and milk.				
Oatmeal	1 oz.			
Treacle	1 ,,			
Milk	½ pt.	19.5	20.0	1.2d.
Bread	2 oz.			
Margarine	¼ ,,			
DINNER—One course.				
Framed from Table 2, with notes Nos. 1 to 5 on p. 262.		30.0	10.0	1.4d.
TEA—Bread and milk.				
Bread	¼ lb.			
Margarine	½ oz.	21.5	19.0	1.2d.
Milk	½ pt.			

XIII.

HOW DOES DIET CAUSE DISEASE?

Effects of Underfeeding.
Effects of Ill-balanced Feeding.
Injurious Effects of Overeating.
Auto-intoxication (self-poisoning).
Strain on Kidneys and Circulation.

Chapter XIII.

HOW DOES DIET CAUSE DISEASE?

It is now widely recognized among the medical profession that a faulty system of feeding is the direct or indirect cause of a number of chronic diseases of everyday life. The fault may consist in—

1. Underfeeding.
2. Ill-balanced feeding.
3. Overfeeding.

It is beyond the scope of the present work to discuss in detail the dietetic treatment of diseased states; these are fully dealt with in the author's work on "Food and Feeding in Health and Disease." We are here only concerned with certain general principles, and with the dietetic treatment of some everyday ailments.

The Effects of Underfeeding are seen as a result of an insufficient diet; this may arise from want of food, as in the undersized, starving children in the slums, or may be due to lack of knowledge among people of the industrial classes as to the principles and practice of sound feeding. It is no uncommon thing to find children of the working classes fed on a starvation diet that is relatively expensive (see also p. 249).

The Effects of Ill-balanced Feeding are seen in anæmia,

induced by a diet consisting largely of tea and bread, to the exclusion of the necessary animal or vegetable proteins; in scurvy, from a dietary deficient in fresh fruit and vegetables; also in rickets, from a deficiency of fats, proteins, and salts, with an excess of carbohydrates. Scurvy rickets is another condition met with in children fed too exclusively on sterilized milk and proprietary foods, to the exclusion of good fresh foods.

The Injurious Effects of Overeating are of far-reaching importance. It has been said that more harm results from overeating than from overdrinking. There is no question that over-indulgence of the appetite is the most important factor in the development of many serious diseases.

The daily amount of food required for the maintenance of good health by a man of average size and weight doing a moderate amount of muscular work is as follows:—

Proteins	90 to 120 grams,	or	approximately	$3\frac{3}{4}$	ounces.
Carbohydrates	400 to 500 ,,	,,	,,	18	,,
Fats...	50 ,,	,,	,,	$1\frac{4}{5}$	,,

If expressed in meals this works out as follows:—

Breakfast.

2 slices of thick bread and butter. 2 eggs.

Dinner.

1 bowl of potato soup.
Large helping of meat with fat.
4 moderate-sized potatoes.
1 thick slice of bread and butter.

Tea.

Glass of milk and 2 thick slices of bread and butter.

Supper.

2 thick slices of bread and butter and 2 ounces of cheese.

There are, however, a large number of people, not en-

gaged in active muscular work, who take a diet greatly in excess of the above. There are many people who regularly take a one or two course meat meal for breakfast, a large two or three course luncheon which is virtually a dinner meal, a good afternoon tea, and a good dinner in the evening, including a large amount of meat and meat foods.

The composition of such a diet is approximately as follows :—

Proteins	160 to 200 grams,	or approximately	5 ounces.
Carbohydrates	550 to 700 ,,	,, ,,	24 ,,
Fats...	100 to 150 ,,	,, ,,	4 ,,

What does a diet of this amount involve? The tissues can only make use of a certain amount of food, and all in excess of that becomes waste matter which has to be got rid of through the kidneys, bowels, and skin, or else is stored up as a poison in the tissues, which will reveal itself by illness sooner or later. Overeating induces disease in one or other of two ways—

1. By setting up auto-intoxication of intestinal origin.
2. By the strain on the kidneys, heart, and blood-vessels, induced by excess of waste products in the blood. These must be more fully referred to.

Auto-intoxication.—The presence of excess of food in the stomach and bowels leads to development of unfavourable bacterial action of the micro-organisms normally present in the digestive tract, as a result of which the food is improperly digested, and products of digestion which have poisonous properties are absorbed into the system. A condition of chronic self-poisoning or auto-intoxication is thus established. This intestinal self-poisoning is responsible for a large group of diseases, which include many cases of anæmia, indigestion, headaches, asthma, neuritis, diseases of blood-

vessels, rheumatism, gout, and other conditions. This auto-intoxication sometimes results from excessive *fermentation of carbohydrate foods*, this being seen chiefly in young girls and women who live too exclusively on bread, bread foods, tea and jam; or it arises from *abnormal decomposition of the proteins*, such as is liable to occur in those who take three rich meat meals a day. It will be obvious that the dietetic treatment of these cases of auto-intoxication is of the first importance. The "fermentation" cases should be treated with a diet chiefly protein in character, the diet being carefully planned, the food given at regular intervals, and no food of any kind given between meals. In cases arising from excessive use of meat foods—putrefaction cases—a lacto-vegetarian régime is advisable (p. 294).

Strain on Kidneys and Circulation.—There are many people who have, unfortunately for themselves, a digestion sufficiently good to enable them to apparently digest and absorb a diet which is considerably in excess of what is good for them. Such subjects may ridicule the idea that their diet is in the least prejudicial to them, because they have no symptoms of ill-health, but, on the contrary, may feel in perfect condition.

Unfortunately, subjective sensations are not always a reliable guide to the state of one's health. Serious and chronic disease of the kidneys, heart, and blood-vessels may exist for years without revealing itself by any apparent disturbance of health; but the breakdown comes sooner or later, and often with dramatic suddenness. There comes a time when the long-continued strain on the kidneys, heart, and blood-vessels becomes greater than the tissues can stand, and at this juncture one of two things happens. The man of fifty years or thereabout who regarded himself as fit and well, has a stroke, with fatal results, or is more or less crippled by

the results of cerebral hæmorrhage or heart failure. The alternative is that the man becomes prematurely old, his vigour fails, his appearance changes for the worse, he becomes short of breath, and on examination it is found that his kidneys have begun to give out, and he is never the same man again. He has chronic nephritis or Bright's disease, which has been developing, unknown to him, for a long time. It is no exaggeration to say that these are everyday clinical pictures. It is equally true to say that in a great many cases they are the outcome of prolonged unphysiological feeding, from indulgence in excess notably in animal protein foods. It is not for a moment contended that this is the only cause of these conditions in all cases, but at the same time there is no doubt whatever that it is the most important cause in a large number of cases; and as prevention is always easier than cure, it is well that attention should be forcibly drawn to it. The reader is here referred to ch. x., which gives an account of the principles to be attended to in the feeding in later years of life.

Attention should be directed to an important factor which contributes to the harmful effects of overeating—namely, the *lack of proper drinking.* A large number of people drink too little fluid, with the result that the natural poisons in the body are not properly dissolved and washed out of the system. A slight excess of food above the actual requirements of health will be attended by no unfavourable results if the organs of excretion—the bowels, kidneys, and skin—are kept judiciously active. Careful regulation of the bowels, the drinking of from one to two pints of water or alkaline water daily on an empty stomach, and the wise use of baths will do much to prevent any harmful results arising from a slight excess of food.

A word may be said as to the use of alcoholic stimulants.

It is a common experience to find that those who overeat, and especially those who take excess of stimulating animal food, are prone to take too freely of alcoholic stimulants. I do not mean to say that they indulge in any way to excess, in the popular sense of that term, but there is no doubt that the frequently recurring extra stimulation of the heart, blood-vessels, and kidneys associated with the taking of wine and liquors in addition to an excessive amount of food-stuffs is an important factor in determining the final break-down.

The following general rules may be laid down as suitable for general application. Attention to these rules would go far to lessen overeating, and diminish the risks of continual over-indulgence.

1. Three good meals a day are enough for any one.
2. Meat should not be partaken of more than once, or at most twice, daily; it should be reduced in amount in later years.
3. Thorough mastication of the food is of the first importance; this promotes proper digestion of the food and lessens the risk of indulgence to excess.
4. The amount of food should be proportionate to the amount of exercise.
5. An ample supply of fluid in the form of drinking-water should be taken; most people drink too little water, or take it at the wrong time.
6. Attention should be closely directed to the functions (1) of the bowels, by use of aperients if necessary; and (2) of the skin, by means of baths.

XIV.

DIET IN FEVERS.

Milk and its Derivatives.
Eggs.
Meat Infusions, Juices, Extracts, etc.
Vegetable Flavouring.
Gelatine.
Farinaceous Foods.
Sugars.
Fruit Juices.
Beverages.
Tea and Coffee.
Stimulants.

GENERAL SERVING OF FOOD FOR INVALIDS.

Chapter XIV.

DIET IN FEVERS.

PRACTICALLY all fevers are of infective origin. They result from the action of microbes which have invaded the tissues, and which have produced toxins or poisons which circulate in the blood, increase the temperature of the body, and induce increased combustion and rapid breaking down of the tissues. Minor degrees of fevers are seen as the result of a slight chill, sore throat, or slight bronchial catarrh; these result from a slight infection of the system from the germs which normally abound in the nose, throat, or bronchial tubes. A greater degree of fever is seen in pneumonia, acute rheumatism, scarlet fever, typhoid fever, and other diseases, the fever being, as a rule, proportionate to the degree of infection. As a consequence of the increased combustion of the tissues that occurs in fevers, there is an *excessive excretion of urea*, the increased solids being often present in the form of a brick-dust-like deposit in the urine. The fever induces a *disturbance of the digestive and absorptive glands*, which is accompanied by loss of appetite and distaste for food. The tongue becomes parched and dry, and the bacteria normally present in the mouth increase in numbers and accumulate at the roots of the teeth, inducing fermentative changes which aggravate the fever, and

at the same time increase the patient's distaste for food. It is, therefore, specially important to attend to the toilet of the mouth. Regular cleaning of the mouth and teeth with an antiseptic mouth wash at least thrice daily checks fermentative processes, and enables the patient to take his food to the best advantage. On account of the great tissue waste that occurs in fevers, careful feeding from the outset of the disease is of the greatest importance for the maintenance of the patient's strength, for increasing his resistance to the toxins which have induced the fever, and for shortening the convalescence.

The principles to be attended to are as follows :—

1. An abundance of fluid must be given. This relieves the dry and parched sensation in the throat and fauces, washes out through the kidneys the waste matter produced by the increased combustion in the tissues, and promotes the elimination of the toxins.

2. The food must be of a nature which can be readily digested and absorbed; with suitable feeding the wasting is less, the patient does not become so reduced, and consequently the convalescence is more rapid.

3. An adequate supply of albuminous, of carbohydrate food, and of gelatine must be given to neutralize the increased breaking down of the tissues resulting from the fever. Fats should be avoided, as the power of digesting fats is greatly interfered with in fevers.

The diet must be selected from the following substances—namely, milk, whey, eggs, meat teas, meat infusions, meat juices, meat extracts, soups, meat jellies, calf's-foot jelly, grape sugar, starches, fruit juices, fruit soup, and beverages of low nutritional value. This diet may be suitably varied by changing the flavouring substances.

Food, in all cases of pyrexia, should be administered in

the fluid form, the quantity small, from three to four ounces at a time, and given at short intervals (every one and a half or two and a half hours) during the day. At night, if the strength is being well maintained, simple drinks to quench the thirst are all that is required; by this arrangement the digestive organs obtain rest.

Milk and its Derivatives.—Milk is the staple article of diet during the early stages of a fever. From two to three ounces of milk, diluted as recommended later, may be given every one and a half hours. If this does not disagree, the amount may be increased. From three to four pints of milk are readily taken by most adult patients. It is almost always necessary to dilute the milk, the amount of dilution depending on the digestive powers of the patient. The diluted milk may be given hot or cold.

The following methods may be adopted:—

1. Simple dilution with boiling water, clear or thick barley-water (ch. xxii.), toast or rice water, in the proportion of equal parts.

2. Dilution with an effervescent water—milk and Vichy or Vals water, equal parts, or milk one part with two portions of potash, soda, or Apollinaris water.

3. Dilution and mixture with an alkali. This method is advisable if there are pain and flatulence after the simply diluted milk. The addition of 10 grains of soda bicarbonate and 10 grains common salt, added to equal parts milk and water, often prevents pain and lessens the constipation. Lime-water in the proportion of one part lime-water to three parts of milk is useful if there are pain and a tendency to diarrhœa. Repugnance to milk can be overcome by modifying the flavour of the milk; for example, tea can be infused with boiled milk, or a very weak cocoa made with Allenbury's milk cocoa can be specially recommended for this.

Horlick's malted milk made with milk is very palatable. A small amount—for example, half a teaspoonful of a meat extract, such as bovril, oxo, lemco, or vigoral—added to a cup of warm milk or milk and water is an excellent way of varying the flavour.

4. Modifications of milk. Occasionally cases occur where diluted milk is not digested, and whey will then be found useful. Its nutritive value may be increased by the addition of strong beef-tea, raw-meat juice, egg-water, or plasmon. A number of useful receipts will be found in ch. xxii. The fermented milks, koumiss and kephir, can sometimes be retained by an irritable stomach when everything else is rejected.

Eggs.—Eggs form another permissible food, but ought not to be allowed too freely. They may be given as a drink, either alone or in combination with milk, or may be used to fortify other nourishment. The lightest form of egg drink is an egg beaten up, added to three ounces of very hot water, strained, and flavoured with vanilla essence or cinnamon, and slightly sweetened. Another form of egg drink, more stimulating and nourishing, is described on p. 54, where milk and sherry are added to the egg. Egg flip is the white of egg added, when well beaten up, to milk or cream, and flavoured. A switched egg may also be added to a cup of tea or coffee. A whole egg, beaten up with three times as much water, strained, and added to light broth or clear soup, is also very nourishing.

Caution.—Do not add the egg to boiling soup, or it will curdle. Albumin water (p. 53) added to a clear soup or to a cup of bovril is nourishing and very pleasant.

Meat Infusions, Juices, Extracts, etc.—This group of foods is largely administered, and its usefulness is universally admitted. In the selection of a beef-tea, it is far

better to use a carefully prepared home-made beef-tea than any of the expensive patented beef-teas and meat juices, which are purchased at a great cost in the belief that they are strengthening. In another chapter (p. 38) full directions are given for the preparation of "teas" (beef, mutton, and veal and chicken). There are two methods described; Method 1 is preferable for fever patients, as the flavour is less concentrated. When the "tea" has been made in the closed jars, as described under Method 2, it is rather strong for most fever patients. Proprietary beef extracts may be given if satisfactory home-made meat teas are not available; they may be thickened as described below, and vegetable flavouring can be obtained by adding boiling water which has been flavoured with vegetables.

Special attention should be given to the means of *thickening the teas* (p. 382) with tapioca, bread crumbs, baked flour, arrowroot, oatmeal, and yolk of egg, the last mentioned being specially pleasant to a patient who is convalescent. The nutritive value of the food may be greatly increased by the addition of one or more of these substances.

Vegetable Flavouring can also be added by cooking vegetables with the meat and straining carefully, without in any way injuring the digestibility of the food. Beef juices and essences, whether home-made or proprietary preparations, are not nearly so suitable for fever patients as the well-diluted teas and extracts referred to above.

Gelatine.—Gelatine is not a tissue builder, but it is the means of saving the albuminous waste from the tissues. From this point of view gelatine cannot be too strongly recommended. Gelatine may be administered in the form of soup from jellied stock—consommé—or may be given as a meat jelly, calf's-foot jelly, or as a sweet jelly. For methods of preparation see ch. xxii.

Farinaceous Foods.—Farinaceous foods in the form of starches and sugar can be given in moderation. The starches may be given as (1) thin oatmeal or barley gruel, carefully strained, and flavoured as desired with salt or sugar (ch. xxii.); (2) arrowroot and farola, used in the same way; or (3) clear soup and beef-tea, slightly thickened with arrowroot, ground rice, or baked flour (see *infra*), consommé with sago or semolina (p. 382). Partially digested starch is given in the form of prepared invalid foods (ch. xxii.) made from Benger's, Savory and Moore's, or "Allenburys" foods, etc.

The sugars can be given in the form of (1) malt extract, granulated; this can be dissolved in warm water, milk, or effervescing water. It is pleasant to take, and supplies grape sugar and maltose, both partially digested sugar. (2) Grape sugar by itself can be procured from the chemist, and is strongly to be recommended; it is used added to farinaceous foods, and also to sweeten beverages.

Fruit juices also contain easily digested sugar, and the juice of grapes and oranges is quite permissible and is much appreciated. It is, however, necessary to note that the skins and stones of grapes should be carefully removed, and in oranges only the juice and pulp should be eaten.

Fruit soups.—These are very pleasant, and much to be recommended. Prepare by boiling fresh or dried fruits with water, with the addition of grape sugar and squeeze of lemon juice. When quite soft they are pressed and the juice strained. This is eaten cold.

Beverages.—An abundance of fluid in the form of water or refreshing drinks should be allowed; if a little ice is added to these drinks, they are very acceptable to fever cases.

Several suggestions for pleasant drinks are given in the chapter on "Recipes," p. 397.

Tea and Coffee freshly made with boiling milk and water equal parts is quite allowable and often craved for by the patient.

Stimulants are seldom necessary or advisable in fever; they should only be given under medical supervision.

General Serving of Food for Invalids.

The manner in which the food is served is of great practical importance. A meal served in a careless, slovenly manner may disgust the patient and seriously retard convalescence.

Everything should be served as daintily as possible, the dishes, glasses, and tray-cloth being thoroughly clean. To most invalids the meals are the events of the day, and too much care cannot be exercised to ensure that all the details should be done in as attractive a way as possible. Patients should not, as a rule, be consulted as to their meals, but there should be an endeavour to ascertain beforehand what the patient likes. Any particular fancy as to sweetness or otherwise should be remembered. Untouched food should never be left in an invalid's room, but should be put aside in a cool place; and no food should be cooked or prepared in the invalid's presence if it can be done elsewhere. Food should never be tasted in presence of the patient, and it should not be cooled by being blown upon, as this naturally disgusts the patient.

In the case of helpless patients who cannot feed themselves, nourishment may be given by the spoon or the feeding-cup. When the patient is very helpless, a useful device is to pull out the cheek, by inserting the finger

between the gum and the cheek, and then introduce the fluid nourishment slowly at one side. A teaspoon is the most convenient size of spoon for child-feeding, and a dessertspoon for the adult. As to drinking-cups, the shape made with three handles is very convenient for the patient to use when feeding himself; but when the services of a nurse are required, a small boat-shaped feeding-cup with a curved spout, and about three inches of rubber tubing attached, is the most useful. In the case of the latter, great care must be taken to maintain thorough cleanliness of the apparatus in use.

In feeding with a spoon or a feeding-cup, it is certainly easier for the patient to have the head raised, if this is permissible; the nurse in these cases passes the left arm under the pillow on which the patient is lying, and gently raises the head.

XV.

LIGHT DIETS.

A MILK DIET.

Skimmed Milk Cure.

Whey Cure.

Koumiss and Kephir Cures.

Soured Milk or Buttermilk Therapy.

A FLUID DIET.

LIGHT SOLID FOOD.

LACTO-VEGETARIAN DIET.

Breakfast.

Lunch and Dinner.

URIC ACID FREE DIETARY.

MEAT AND HOT WATER (Salisbury Diet).

Chapter XV

LIGHT DIETS.

In many acute diseases, other than fevers referred to in the preceding chapter, and also in certain chronic ailments unaccompanied with fevers, a light diet is indicated. By that we mean a diet which is simple, easily digested and absorbed, one which is adapted to the temporarily enfeebled state of the digestive juices. A light diet is also indicated in the later states of acute fever, prior to returning to ordinary feeding. The following examples of light dietary are frequently recommended by medical men :—

1. A milk diet.
2. A fluid diet.
3. Light solid food, or "light diet."
4. Lacto-vegetarian régime.
5. Uric acid free diet.
6. Meat and hot water diet.

A MILK DIET.

This consists in the administration of three to five pints of milk in the twenty-four hours. This should be given in measured quantity every four hours. It may be given diluted. In exceptional cases, in which milk cannot be

well digested, whey, skimmed milk, or koumiss may be advantageously given. In the case of patients on a milk régime, the milk must not be looked on as a drink, but should be given as a food at regular intervals and in regulated amount. If necessary, ample fluid should be given in the form of water, alkaline water, or other thirst quenchers described in ch. xxii.

Skimmed Milk Cure.—A diet of skimmed milk has very special value in cases where it is desired to rest the digestive organs to enable them to recover from an exhausted and irritable condition. It is useful in cases of intestinal indigestion and chronic catarrh of the small and large bowel (colitis). The diet at first is restricted to skimmed milk, which should be freshly prepared, and given in conjunction with mineral water. To begin with, from four to six ounces should be given every two and a half hours, the amount being gradually increased until ten to twelve tumblerfuls are taken daily. If desired, the milk may be flavoured with weak tea or coffee, and a pinch of salt may be advantageously added. After four to six days of this régime, during which time the patient is confined to bed, the diet may usually be increased by the addition of stale bread, dry toast, or a malted invalid food. Solid food is best withheld for one to two weeks, when a little lean, raw, scraped beef may usually be added to the dietary. To begin with, patients lose weight on this régime, and they may complain of drowsiness or general weakness. The urine is increased in amount, is of low specific gravity, and of a pale, slightly greenish tint. Constipation may be a feature, and is best treated by adding fruit to the diet—for example, prunes or stewed apples, once daily in the forenoon. In some patients diarrhœa and vomiting are set up, this being remedied by reducing the amount of milk, or lengthening the interval between meals,

and the addition of sodium citrate or lime water to the milk. In favourable cases the state of the digestion and of the intestinal excretion rapidly improves on this régime, enabling the patient to return in a few weeks to a light, convalescent dietary.

Whey Cure.—Whey is practically an aqueous solution of milk sugar. A whey cure is advocated in some cases of chronic indigestion. It consists in the administration of from twenty to forty ounces of whey daily, which is taken warm either alone or with a mineral water. It is given in combination with a vegetarian and fruit régime. In cases of abdominal plethora, as much as eight to ten tumblerfuls may be given daily with a diet of fruit and vegetables. It is sometimes combined with a grape cure. When taken in large amount it sometimes induces diarrhœa and colic.

The Koumiss and Kephir Cures.—The general properties of koumiss and kephir are given on p. 45. Koumiss contains from one to two per cent. of alcohol. It is more easily digested and more completely absorbed than ordinary milk, and can be taken in large amounts. It is diuretic, gently laxative, and, like other milk cures, lessens intestinal putrefaction in virtue of the lactic acid which it contains. On an average from two to four quarts are taken daily, but much larger quantities are taken at the special "cure" resorts in Russia where the method is in vogue. The koumiss is given in combination with nourishing food of a protein nature—carbohydrates, fruits, and saccharine foods being specially restricted. Lime water is added if diarrhœa is present. This koumiss cure is largely employed in Russia in the treatment of pulmonary tuberculosis. In this country the special value of koumiss lies in its being a valuable milk preparation, which can be taken by many patients with whom plain milk and its other modifications disagree.

Soured Milk or Buttermilk Therapy.—In the last year or two a valuable method of treatment by means of soured milk and other methods of administering selected lactic germs has been brought to the notice of the profession by the distinguished French bacteriologist, Eli Metchnikoff, of the Pasteur Institute, Paris.

It is well known that lactic acid is a powerful anti-putrefactive agent. When milk turns sour—that is to say, when the milk sugar has undergone lactic fermentation with the formation of lactic acid—it can then resist putrefaction for a long time. This fermentative property, first shown by Metchnikoff, induced him to employ cultures of the lactic germs in order to produce nascent lactic acid in the bowels.

In the process of curdling, milk is rendered more easily digested, as a large proportion of the casein is rendered soluble. Curdled milk is therefore both a food and a medicine.

Certain cases of chronic intestinal catarrh, pernicious anæmia, subacute and chronic nephritis, rheumatism, and gout are very strikingly benefited by the administration of soured milk and other methods of administering lactic germs. The treatment is of special value in cases of auto-intoxication resulting from abnormal putrefaction of proteins; it has little value in cases due to excessive fermentation of starchy foods.

It may be given as buttermilk, which is the residual milk left after churning and removing the fat; or as soured milk, which differs from buttermilk in that the fat has not been removed; or in the form of one of the many commercial preparations of lactic bacilli at present in the market—for example, Lacto-Bacilline, Sauerin, Lactigen, Trilactine, which are added to the milk for the preparation of an

artificial soured milk. Unfortunately these preparations cannot be implicitly relied on, as it has been found that they sometimes contain no active lactic acid bacilli.

When a freshly made buttermilk from a good source is obtainable, this is probably, on the whole, the safest method of administration. Here again, however, we have to bear in mind its uncertain composition. The "strain" of germs used in the preparation of commercial buttermilk is, as a rule, renewed every three weeks; as the strain gets attenuated, there is a corresponding increase in the number of other bacteria present in the milk, and the presence of these may interfere with the action of the lactic germs present. In the same way, if milk has been doctored by the addition of preservatives, the curdling may be prevented even although the lactic bacilli are active. There are also specially prepared buttermilk preparations in the market made from the Bulgarian bacillus—for example, fermenlactyl, made by the Aylesbury Dairy Company. Bulgarian soured milk chocolates (Rowntree's), and a cheese containing lactic bacilli in large numbers (Lactic St. Ivel cheese), are other forms in which the lactic germs are given. Under the influence of the administration of an active preparation of lactic acid bacilli in suitable cases, a very notable improvement in the state of the stools is brought about; these lose their fetor and become formed, presenting a marked contrast to the extremely fetid, pultaceous stools originally present. It will readily be understood that lactic acid producing germs is more likely to have a beneficial effect when the diet is kept simple.

A FLUID DIET.

This includes milk, beef-tea, chicken and mutton broth, and fruit juice, described under "Fever Diet" (p. 273). The milk and the thin beef-teas are now to be thickened; light soups, egg drink, and various jellies being mainly given.

The thickening of milk should be done with the more easily digested starches either in the form of some invalid food (Benger's or Savory and Moore's, etc., p. 160 and ch. xxii.), or from a well-cooked simple gruel, or a malted gruel (ch. xxii.). Bread-stuffs are to be given in small quantities; thin slices of toast, crusty part of a Vienna roll, sweetened or unsweetened rusks, toasted sponge finger biscuits, rice biscuits may be recommended. Stale bread from pan loaves, or veda, hovis, or bermaline are also allowable when given in thin pieces and when the bread is not too new.

Suggested Diet.

(*A.*)

Seven a.m.—A small cup of milk, warmed with freshly made tea.

Eight-thirty a.m.—Milk, 8 ounces, and thick barley water (ch. xxii.). Half slice crisp toast.

Eleven-thirty a.m.—Calf's-foot jelly or chicken jelly, 2 ounces.

One p.m.—Thick beef-tea (p. 383). A few grapes (juice and pulp only).

Four p.m.—Cup of hot milk, or diluted with freshly made tea. Thin slice bread and butter.

Six-thirty p.m.—Cup of invalid food (Benger's or Allenburys, p. 160).

Nine p.m.—Cup of thin beef-tea (Method 1, p. 382) or chicken tea.

The above fluid diet may be made slightly richer as follows:—

(*B.*)

Seven a.m.—Milk and hot water and freshly made tea.

Eight-thirty a.m.—Malted gruel or water gruel eaten with cream—a saucerful.

Eleven-thirty a.m.—Milk, 8 ounces, with pancreatized cocoa (Allenburys), and a plain biscuit.

One p.m.—Thick beef-tea (p. 383). A small dish of curds or a blanc-mange).

Four p.m.—Cup of tea, milk and cream, slice bread and butter, one sponge biscuit.

Six-thirty p.m.—Boiled custard, sweetened, or made with meat extract (p. 411), with biscuit.

Nine p.m.—Chicken soup, restorative or veal jelly (ch. xxii.).

LIGHT SOLID FOOD.

Consists in the light, nutritive, and more easily digested food-stuffs; what is commonly known as a "light diet."

This includes in addition to the foods, allowed under "fluid" diet, lightly cooked eggs, either plain, boiled, poached, or scrambled, or in the form of a custard soufflé or omelet (pp. 404, 405), or combined as in milk puddings with a farinaceous food. As the digestion improves a more liberal allowance of solid food may be given, including fish (white varieties), sweetbreads, chicken, turkeys, game, pigeons, and rabbit. The red meats are allowed afterwards, and may be given in the form of beef quenelles, beefsteak minced (not mince collops), eye of a tender-loin chop, a small underdone fillet of beef, a slice from undercut of a lightly cooked sirloin of beef, slice of roast mutton. Vegetables and stewed fruits are also allowed.

The following are the most suitable vegetables: Spinach, boiled lettuce, baked tomatoes (skinned), asparagus (steamed), celery (stewed), seakale, young leeks, Portugal onions, cauliflower, and vegetable marrow. The best methods of cooking these vegetables are described on p. 385. They can be served with a well-made white sauce. With regard to fruit, what has been said under fevers on p. 280 here

applies. Stewed fruit is better than raw fruit, and all the skin should be carefully removed. The seed fruits—for example, raspberries, currants, brambles, and figs—should not be given. I now append suggested diets of a graded character, suitable for patients with normal digestion recovering from an acute illness; and also two diets of the same light nature, but rather more restricted both as to number of meals and kind of food, suitable for patients with weakened digestive capacity.

Table of Four suggested Light Diets.

I.	II.
Seven a.m.— Cup of tea, freshly made. Half-slice bread and butter.	
Breakfast.— Saucerful of gruel with cream. Small cup of tea. Crusty roll and butter.	A lightly boiled egg. Cup of tea or milk. Toast, roll and butter.
Eleven a.m.— Cup of clear beef or chicken tea. Strip of toast.	Milk and potash, biscuit. A little fruit.
Dinner (1.30 p.m.).— Steamed whiting. Half slice bread. Milk pudding (semolina or ground rice). Milk, 6 ounces.	Chicken roast with bread sauce. Vegetable—cauliflower, stewed vegetable marrow. No potatoes. Apples roasted or apple cream, eat with cream. Milk, 6 ounces.
Four-thirty p.m.— Milk and soda or milk and freshly made tea, bread and butter, sponge cake.	Afternoon tea, avoiding rich cakes and pastry.
Six-thirty p.m.— Savoury custard.	Oysters (ch. xxii.), omelet (fish), or a soufflé (ch. xxii.). Glass of milk or Horlick's malted milk.

Nine p.m.—

A meat infusion (beef, mutton, chicken, or veal), or cup of thin invalid food.

III.

Breakfast.—

Steamed fish, whiting or sole. Tea, bread, toast, butter, and a little jelly.

Eleven a.m.—

Milk and potash, or clear soup. A little fruit.

Dinner (1.30 p.m.).—

Sweetbread or tripe (ch. xxii.). Vegetable — tomato (stewed pulp only), or spinach. Stewed fruit passed through sieve, a baked custard, or a milk pudding.

Four-thirty p.m.—

Same as No. II.

Six-thirty p.m.—

Poached egg on toast, spinach. Curds and cream. Milk and potash or milk and peptonized cocoa.

IV.

Fried bacon (streaky Wiltshire), Tea or coffee, milk, toast, bread, etc. Butter and jam.

Egg flip or soup, or milk and potash and a little fruit.

Fillet of beef or mutton chop, gravy, but no made-up sauce. Vegetable or a few potato chips. Sweet jelly or blancmange.

Same as No. II.

Fish. Milk pudding. Milk and potash.

LIGHT DIET SUITABLE FOR WEAKENED DIGESTION.

Seven a.m.—Give nothing except 6 ounces of hot water, unless patient has had a bad night, in which case give 8 ounces of equal parts milk and water.

Eight-thirty a.m.—Pancreatized cocoa made with milk, 8 ounces, bread and butter or toast and butter.

One p.m.—Soup, 8 ounces, from vegetable stock thickened with milk and cream or a weak meat broth—all the vegetables strained. Light milk pudding—custard or blancmange. Milk diluted with water or Seltzer, 8 ounces altogether.

Four p.m.—Milk, 8 ounces, flavoured with freshly made tea, cream, sponge biscuit or rusk, or thin slice bread and butter.

Seven p.m.—As at lunch, soup and pudding, or a lightly boiled or scrambled egg.

Nine-thirty p.m.—Milk, 8 ounces, with Horlick's malted milk.

Light Diet of a Dry Character.

Breakfast.—Tea or coffee weak with milk, quantity restricted to 4 or 5 ounces; a slice of crisp toast and butter; a fillet of fish, or a boiled or poached egg.

One-thirty p.m.—*The chief meal* of the day should consist of two courses only, the fluid taken to be not more than 4 ounces: Fish, meat, and one vegetable; or, fish and light pudding; or, meat and one vegetable, with light pudding.

Five p.m.—One small cup of freshly made tea, preferably China, with cream and sugar.

Seven p.m.—A one-course meal course may be: Beef juice mince (ch. xxii.); fish with toast; chicken or game purée, rusk; savoury custards (Bovril or cheese); egg in some form, omelet or a soufflé. Avoid farinaceous foods at this meal and restrict fluid to 4 ounces.

Nine-thirty p.m.—Hot water, 6 ounces.

LACTO-VEGETARIAN DIET.

Vegetable food-stuffs are on the whole less appetizing than animal foods, and accordingly the vegetarian feeder is less exposed to over-indulgence with its attendant unfavourable results. A lacto-vegetarian diet if carefully selected is to be regarded as a form of light diet, and is useful in some diseased conditions. In later life it is a wise rule to restrict more and more the rich animal foods that can be taken with impunity in earlier years, and have recourse to a largely meat free diet (see p. 225).

There is often difficulty in planning the meals for a lacto-vegetarian dietary, and the following may be helpful:—

Breakfast.—This meal can consist of oaten or wheaten porridge, or any other cereal; whole-meal bread and white

bread, scones, rolls, butter, eggs cooked in any form, jams, marmalade.

Lunch and Dinner.—The soups must be made from vegetable stock (p. 386), and thickened with various forms of cereal brown or white roux, tapioca, sago, barley, rice, milk, eggs, and the various forms of vegetables. Farinaceous foods and savoury dishes, pulses and nut meats, eggs in various forms, and preparations with cheese take the place of meats and entrées. Vegetables and salads, puddings, fruits, and cheese are all permissible.

URIC ACID FREE DIETARY.

A special form of light diet is that known as a uric acid free dietary. This dietary has been recommended for gout, renal disease, headaches, and various chronic diseases. This system is based on the theory that these diseases are due to the retention of uric acid in the system. It is now known that this theory is erroneous, the uric acid being a result rather than a cause of the diseases in question. A uric acid free diet is, however, a form of light diet, and as such is of value in special cases. A short account is here given of the various food-stuffs which contain uric acid or purin, and of the advantages and defects of this system of feeding.

Meat and meat extracts contain a large amount of purins; similarly, certain glandular organs, such as the pancreas and liver, are rich in purins. They are also present, though in smaller amount, in many vegetable foods (for example, beans, lentils, and oatmeal), and they are relatively abundant in some accessory articles of diet, notably tea and coffee.

Milk, white bread, and potatoes contain practically no uric acid or other purins. Similarly, cream, butter, fats, eggs,

apples, grapes, figs, dates, and raisins are purin free. Macaroni, cheese, and nuts are in the same category. In comparison with foods containing purins, we, therefore, see that purin-free foods are on the whole much less appetizing, and on that account are less likely to be taken to excess. A typical purin-free dietary is as follows :—

Breakfast.—One pint of milk ; bananas ; apples ; pears ; plums, fresh, dried, or cooked ; any other fresh fruit. (Eaten to any extent for which there is appetite.)

Lunch.—Vegetable soup made with milk ; potatoes with butter, oil, or milk ; two ounces of cheese, eaten with potatoes and any other vegetables in season ; stewed fruit or tart ; fresh fruit ; one pint of milk drunk during the meal.

Dinner.—Much as lunch : one pint milk ; one ounce cheese.

Any variety of vegetables and fruit in season. If potatoes and fruit are taken in large quantity, less milk and cheese will be required.

In order to get the best results from treatment, the transition from an ordinary diet to a purin-free dietary should not be effected too quickly. At the outset there may be slight difficulty in digesting certain foods, and constipation may be a troublesome feature. These difficulties are not as a rule difficult to overcome. It is of the first importance to enjoin thorough mastication of the food.

The *advantages* may be summarized as follows : It is a simple diet ; its adoption prevents overeating ; it restricts intestinal putrefaction and so prevents auto-intoxication from the products of imperfectly digested protein foods ; it has the further advantage of being a "special system," and on that account is followed more rigidly and therefore more successfully than other dietaries framed along more conventional lines. These advantages give this system of feeding a distinct place in therapeutics. Its undoubted

value is probably explained along the lines just referred to rather than by regard to any specific action associated with the absence of uric acid in the dietary.

The *disadvantages* of the diet must be referred to. Some patients find the régime very unattractive, and as a result the amount of food taken, and especially the amount of protein food, falls below the necessary standard, and ill-health results from a continuation of the diet. In others its too rigid adoption may induce diarrhœa and other gastro-intestinal disturbances, with resulting deterioration in health.

MEAT AND HOT WATER (Salisbury Diet).

At first sight it appears strange to include a meat and water diet in a section on light dietaries. It is in reality, however, a simple diet, which, if not maintained too long, is easily digested and unattended with any unfavourable results.

Many years ago a hot water diet, commonly known as the Salisbury treatment, was recommended by Dr. Salisbury for the treatment of chronic gout, obesity, chronic gastro-intestinal derangements, and other disorders of nutrition, which were attributed by Salisbury to abnormal carbohydrate fermentation. In its strict form the treatment consists in the daily administration of one to three pounds of meat, with three to five pints of hot water, for a period of four to twelve weeks. The slightly nauseating taste of plain hot water may be overcome by the addition of ginger, lemon juice, or weak tea, and in cases associated with intense thirst the addition of a little nitrate of potash makes the water a more efficient thirst quencher. If constipation is present, a teaspoonful of magnesium sulphate can be added to the

water. The chief article of diet is finely minced steak, which allows the patient to get the maximum of nitrogeneous food with the minimum of digestive work. At first the patient begins with lean meat or beef in mince or cakes. If unable to assimilate solid food, other preparations—Carnrick's liquid peptonoids, peptonized home-made beef-teas and essences, Wyeth's beef juice, Brand's beef juice, oxo, and carnine Lefranc—may be used instead. Gradually the patient begins to take lean mutton cakes and the white meat of chicken. The white of an egg, raw, lightly boiled, or poached, is also allowed. The following directions will be found useful in the preparation of the cakes.

Lean Meat Cakes.—The beef should be taken from well-grown animals, and steaks cut from the centre of the round are the best for this purpose. The beef-pulps can be prepared in the following manner: all the fat, fascia, and connective tissue and bone are removed, and the meat is placed on a board or in a chipping tray, and is shredded down with a blunt knife ; the pulp is then scraped together with a spoon—the result is that all the tough fibrinous parts remain behind. The scraped pulp is lightly moulded by the hand into cakes from ½ to 1 inch thick, and slowly boiled over a clear fire free from smoke. When cooked, serve on a hot plate with a little butter and season to taste with pepper and salt. The flavouring may be varied by using Worcestershire or Halford sauce, mustard and horseradish, or lemon juice. A small quantity of dry celery is also permissible. From 4 to 6 ounces of meat is the maximum that can usually be taken at a meal at the outset of the treatment ; later 8 to 10 ounces or more may be taken by some patients. Four meals should be taken daily.

Great care and consideration are called for both in the recommendation of this diet and the best means of giving effect to it. A modified Salisbury dietary (see *infra*) is of great value in some cases of indigestion and chronic auto-intoxication associated with it. A régime like the following will be found of great value in such cases :—

Modified Salisbury Diet.

Seven a.m.—
½ pint or more hot water.

Eight-thirty a.m.—
4 to 6 oz. meat rissoles.
2 Kalari biscuits (p. 336), with a little butter.
Small cup of very weak tea.

Eleven-thirty a.m.—
½ pint or more of hot water, flavoured with lemon if desired.

One p.m.—
Breakfast-cupful of beef-tea with ¼ lb. scraped meat (see beef purée, ch. xxii.).
Thin slice of baked bread or dinner toast (p. 388).
Half a dozen oysters as above, (see also ch. xxii.); or,
Consommé with custard (ch. xxii.), or consommé with egg (ch. xxii.), with baked bread or toast.

Three p.m.—
½ pint or more of hot water.

Four-thirty p.m.—
Breakfast-cupful of skimmed milk, to which is added a full tablespoonful of carnine Lefranc or other meat juice; or,
Plain egg flip (p. 54), flavoured with cinnamon in place of sugar.
Unsweetened rusk or crisp biscuits.

Six p.m.—
½ pint hot water.

Seven-thirty p.m.—
4 to 6 oz. meat rissoles or mince, followed by an egg jelly (ch. xxii.) in which the sugar is reduced in amount; or, a blancmange made with milk in place of cream (ch. xxii.).

The above régime should be maintained for ten days to a fortnight, after which additions in the form of steamed fish, chicken, malted breads, green vegetables, jellies, and fruit can be slowly made. The return to ordinary farinaceous foods must be made very gradually, preferably starting with the invalid foods (p. 160).

While the nutritive value of this diet is comparatively small, it amply suffices for the short time in which the diet is necessary. Its use effects a profound improvement in the state of the intestinal excretions, and a corresponding improvement in digestion as a whole.

A meat diet is specially recommended in tuberculous affections. In 1889, C. Richet and Hericourt experimentally proved the value of a raw meat diet in tuberculosis in dogs, and showed that the benefit was derived from the muscle juice and not from the muscle fibre—zomotherapy. A recently introduced muscle juice, carnine Lefranc, is a valuable meat-juice preparation. It has an agreeable taste; it keeps well, and may be given in doses of from 1 to 4 ounces daily in any fluid except beef-tea.

XVI.

INDIGESTION.

PRACTICAL RULES IN THE TREATMENT OF INDIGESTION.

Small Meals.

A sufficient amount of Time should be allowed between Meals.

Avoid sitting down to Food immediately after hard Physical or Mental Work.

Suitable Types of Food—
- Simple Light Soups.
- Meats.
- White Varieties of Fish.
- Sauces.
- Fat.
- Bread.
- Sweet Dishes.
- Tea or Coffee.

CONSTIPATION.

Chapter XVI.

INDIGESTION.

Symptoms—Causes—Practical Rules in Treatment—Constipation.

Under the vague term indigestion there is comprised a number of disorders which have one feature in common—the inability to digest ordinary food in the painless, unconscious manner characteristic of health. When discomfort instead of a sense of well-being accompanies digestion, the term indigestion or dyspepsia is applied to the condition. The symptoms commonly associated with indigestion are :—

1. Variations in the appetite—loss of appetite, distaste for food, feeling of emptiness, or abnormal craving for food.
2. Pain or discomfort in the region of the stomach, either immediately after food or from two to three hours after a meal. This may take the form of a simple feeling of distension, severe gnawing, or acute pain.
3. Acidity and waterbrash. The former is the eructation of an irritating acid secretion which stings the throat, usually inducing a sensation of heat in the pit of the stomach (heartburn); the latter is the vomiting of a clear watery fluid.

4. Bad taste in the mouth, especially in the mornings. Flatulence and eructations are common and troublesome symptoms. A feeling of sickness (nausea) or actual vomiting is also frequently present.
5. General physical and mental depression, headache, sleeplessness, and palpitation are general symptoms commonly seen in cases of indigestion.
6. The tongue is deranged; it is usually flabby and dirty, with a coating of whitish or yellowish-white fur.

The more common causes of indigestion are:—

1. Dietetic errors. This may take the following form:—
   (*a*) Improper food, a diet containing too large a proportion of a particular kind of food—*e.g.* meat, fat, vegetables, or tea.
   (*b*) Excess of food or too little food.
   (*c*) Irregularity in meals. Too short or too long intervals between meals.
   (*d*) Hurried meals, with imperfect mastication of food.
   (*e*) Excess of fluid with meals—such as tea, soup, beer, etc.; also alcoholic stimulants taken between meals.
   (*f*) Faulty meals—*e.g.* meat teas.
2. Constitutional conditions—such as tuberculosis, anæmia, gout, rheumatism.
3. Mental emotions—for example, worry and overwork.
4. Contributory—*e.g.* excess of tobacco, decayed teeth, and constipation.

Principles in the dietetic treatment: In the slighter cases all that is required is to correct the defects in the dietary, which may be ascertained from a careful inquiry into the

dietetic history of the patient. Tea must be reduced or eliminated from the dietary, sweets should be cut off, bread and starchy foods must be reduced, and all indigestible articles of food should be avoided. In cases where meat foods have been taken three or four times daily, these must be reduced, and a lacto-vegetarian régime substituted (p. 294). If these points are attended to, and three simple meals a day prescribed, recovery soon takes place.

In the more severe cases the above will not suffice. Here complete rest in bed for some weeks is essential, and the diet from the outset has to be adapted to the digestive capacity of the patient. It may be necessary to begin with a diet of 1, 2, or 3 pints of milk in twenty-four hours, which may require to be given diluted or peptonized. As the state of digestion improves, beef-tea, bread, and milk puddings are cautiously added to the dietary. In some cases it is useful to add some extract of malt—for example, maltina, extract of malt, homax. If the symptoms persist in spite of treatment carried out carefully along these lines, it may point to the conclusion that the case is one of actual disease of the stomach or bowel, necessitating surgical treatment.

The only other point to which it is necessary to draw attention is to cases in which flatulence is the predominant feature. In these cases it is essential to specially restrict the vegetables and pulse foods. An appropriate régime will be found on p. 294.

PRACTICAL RULES IN THE TREATMENT OF INDIGESTION.

1. **Small Meals**, slowly and deliberately eaten, are the first essential. The meals should be small, and very moderate in quantity. A diet should be selected that gives the necessary

nourishment with the least labour to the stomach (see p. 285). Thorough mastication is of paramount importance. Particular attention should also be directed to the state of the teeth.

2. **A sufficient amount of Time should be allowed between Meals** to permit of complete digestion of one meal before the next is taken. When on a fluid diet (for example, p. 285), and only very small quantities being taken at a time, the meals must be taken more frequently—for example, every two and a half to three hours; but when solid food is taken, four to five hours should elapse before the next meal. This is specially important in dyspepsia in elderly subjects.

3. **Avoid sitting down to Food immediately after hard Physical or Mental Work,** and do not return to work immediately after a meal.

4. A few notes on the most **suitable types of food** may be added.

It is exceedingly important that the food of the dyspeptic should be carefully and skilfully cooked. **Simple light soups,** unthickened, may be sometimes taken in small quantity. Of the **meats,** the shorter fibred and more easily digested meats and fish should be selected. Chicken, turkey, pheasant, partridge, sweetbread, tripe, and mutton are better than beef, goose, duck, wildfowl, veal, or pork. Lamb and rabbit are not so digestible as is often assumed. **The white varieties** of fish—for example, sole, whiting, plaice, flounder—are the best, and fish is best grilled, plainly boiled, or steamed. Plainly cooked—for example, roast or grilled—meats are the best; no made-up dishes should be taken. Vegetables should be smoothly mashed or reduced to the form of purées. Potatoes and other root vegetables are better avoided. For cooking, if the meat is tender, grilling is the best method; underdone roast is also good.

As to **Sauces,** it is best for dyspeptics to avoid rich sauces

entirely; and when butter is required, as with fish, to use plain fresh butter.

Fat in some forms is difficult to digest. Grilled fat bacon eaten with dry toast is easily digested, tasty, and a good form of fatty food. When taken with bread and yolk of egg it makes a nutritive and compact meal. Bread-stuffs saturated with butter—such as buttered toast, hot scones, muffins, pastry—are not easily digested, the saturation with fat preventing the gastric juice getting at it, with the result that these foods undergo abnormal fermentative changes.

Some varieties of **bread are indigestible,** but often when complained about it is found that the patient is taking too much. A digestible bread is one that is not new, which breaks short, is open, and crumbs easily (pan loaf); scones and whole-meal bread are often very troublesome for people with feeble digestive powers (see "Bread," p. 387).

Sweet Dishes are apt to undergo acid fermentation, and unripe acid fruits and nuts, potatoes, and all root vegetables should be avoided. A list of starch-free puddings is given on p. 433.

Tea and Coffee do not always cause indigestion, but are apt to do so in some persons. If they do cause indigestion they should never be taken with or soon after food, but a cup of freshly made tea or coffee three or four minutes after a meal will not infrequently be found to promote the final stage of stomach digestion. No food, however, should be eaten at the same time. Light China teas are much less likely to cause dyspepsia than the stronger Indian kinds. The mixed meal known as a "meat tea" should never be taken, as the tannin in the tea combines with the albumin in the meat, interfering with its digestion. (See also p. 110.)

CONSTIPATION.

A few words may be said about the dietetic treatment of constipation.

Green vegetables, oatmeal, and whole-meal bread should enter largely into the diet of constipated subjects. Fruits are also of great value, more especially figs, prunes, dates, apples, pears, oranges, and peaches. Fruit should be taken once or twice a day; it may be taken fresh or stewed, and it is best taken on an empty stomach the first thing in the morning. Fat is useful as a lubricant, and the patient should be encouraged to take plenty of butter and cream. A little marmalade, honey, or treacle taken at breakfast has a useful aperient action. A common fault in the dietary of constipated subjects is a deficiency in fluid, and patients should therefore be encouraged to drink two or three pints of fluid per day, one tumblerful of hot or cold water being taken the first thing in the morning. Excess of meat and excess of tea are factors in the development of constipation, and the amount of these must be restricted. There are many factors at work in the development of constipation, and these require attention as well as the diet. Lack of exercise, too sedentary habits, matutinal hurry, are important contributory causes. Defective education of children as to the requirement of the regular habit of going to stool is often the primary cause; this can to some extent be corrected by cultivating regularity in habit in later life. In looking for recovery from constipation in long-standing cases it is essential to point out to the patient the necessity of patience, and the long-continued use of a diet adapted to the condition. Massage and suitable exercises are important aids in treatment.

XVII.

GOUT AND RHEUMATISM.

I. GOUT.

Introduction.
Cause.
Suitable Foods :—
Meats—Fish—Milk and Milk Products—Eggs—Carbohydrates —Vegetables.
Beverages.

II. CHRONIC RHEUMATISM AND RHEUMATOID ARTHRITIS.

The Result of Intestinal Fermentation.

The Result of Intestinal Putrefaction.

Chapter XVII.

GOUT AND RHEUMATISM.

I. GOUT.

It has been truly said that if a sprightly writer wished to make fun of the medical profession, nothing would give him a better opportunity for the exercise of his sarcasm than the extreme variety and the very opposite character of the régime which this, that, and the other medical authority have laid down for the dietetic treatment of the gouty state. Some recommend a diet mainly vegetarian in character; others find salvation in meat and hot water; and, apart from these two extremes, when we have regard to the numerous articles of food and drink in daily use, we find very few that are not as stringently forbidden by some writers as they are highly commended by others. The reason for this is readily found in our ignorance of the exact nature of the disease. We know that gout is a constitutional disease whose natural history includes a liability to rapid and apparently inexplicable variations, often, fortunately, of the nature of amelioration or complete disappearance of symptoms. If these natural variations occur coincidentally with the use of some supposed therapeutic measure, medical or dietetic, there is a risk of the observer wrongfully ascribing the benefit to the therapeutic agent employed, where it is in reality due to the

self-righting power of nature. He becomes what has been aptly termed the victim of misinterpreted sequences. While the causation of gout is not exactly known, brief mention may be made of the view as to its origin most widely held at the present day. In opposition to the views formerly held, there is now general agreement that uric acid is not the cause of gout, any excess of uric acid that may be present in the urine now being regarded as merely an incident in the disease.

Gout is essentially a disorder of the metabolism of the protein elements of the food. In its etiology there are two main factors—(1) **a particular diathesis or soil,** and (2) **a superadded infective element.** It is now some ten years since the writer first advocated the view that there is an infective element in gout, the source of the infection being the digestive tract. This view is now very widely held, although it cannot be said to have been fully proved. For practical purposes, however, it may be taken as assured that all gouty subjects are, in virtue of their diathetic tendency, specially prone to a particular type of auto-intoxication (self-poisoning) which is responsible for various gouty symptoms.

Derangement of the digestive system plays an exceedingly important rôle in the development both of acute and chronic gout, and these derangements usually depend either on immoderate eating or drinking, or on the ingestion of articles of diet especially unsuited to the individual. The question of diet is therefore the paramount one, and we have now to consider the influence of different food-stuffs on the disease.

Meats.—The most recent observations indicate that the commonly accepted view that a meat diet is associated with an increase in the uric acid excretion is an erroneous one; and on the whole it may be taken as definitely proved that,

as a rule, a gouty subject may take a measured quantity of meats in an easily digested form. In the use of meats it is not only important that these should be taken in a form which is easily digested and absorbed, but that they should not be accompanied by an undue admixture of other food-stuffs. In those cases where meat is unsuitable we must look for the cause of any injurious effects more in its quality and in the form in which it is administered. We must, however, bear in mind that a rich meat diet—that is, meat twice or thrice daily—is an acid food; its tendency to acidity may in favourable cases be rectified by the consumption of alkaline table waters.

With regard to the different kinds of meat foods, white meats—for example, fish and chicken—are more suitable than red meats owing to their more ready digestibility, and also, in the case of fish, to the smaller proportion of nitrogen present in equal bulk. High game and very fatty meats should be avoided. The confirmed gouty subject is wise to limit his consumption of red meats to one meal in the day, or even less, and, further, to make as a routine a selection of the red and white meats, similar to that here indicated:—

Breakfast.—Avoid kidneys, steak, liver, and all made-up dishes, and only take one solid—for example, fish of any kind (except salmon and fatty fishes), one or two eggs, or bacon and egg; one breakfastcupful of freshly-made tea, with not more than one piece of sugar; toasted bread, Vienna rolls, or other bread (not too new or doughy), with butter; marmalade or jam to be taken only in very small quantity, and even then not to be taken every day.

Lunch.—To be mainly vegetarian. Selections from the following: tomatoes, cooked or raw; macaroni, dressed in various ways; salads, celery, cauliflower *au gratin;* bread, brown bread, Vienna rolls, or any form of unsweetened biscuit; small piece of mild cheese, if desired; small quantity of fruit—one of the following: oranges, raisins, apples, figs, dates, walnuts.

Afternoon Tea.—One or two small cups of tea, with a thin slice of bread and butter, or a piece of very light cake. Very little solid should be taken, and especially no rich cakes.

Dinner.—The dinner to consist of three courses, to which fruit can be added, if not taken to lunch. The diet to be arranged on the following plan:—

1.	2.	3.	4.	5.
Soup.	Fish.	Soup.	Fish.	Soup.
Meat.	Meat.	Entrée.*	Meat.	Fish.
Pudding.	Savoury.	Pudding.	Pudding.	Savoury.
Fruit.		Fruit.		

Care has to be taken that, on the nights when meat is taken, the soup should be of a lighter character—for example, clear brown, rice, or fish soup. Similarly, on nights 2 and 4, the fish should be of the lighter kind—for example, whiting, haddock, or sole. On the fifth night the soup can be richer—for example, oxtail or kidney, with a light fish; or the soup may be light, and the fish more rich—for example, turbot, halibut, or skate. No more than two vegetables are to be allowed, and then in sparing amount—a sauce to be reckoned as a vegetable. (Half an ounce of whisky, in not more than half a tumblerful of water, is the only safe beverage for constant use.)

A few practical points may be mentioned about the culinary aspects of soups, meats, and fish. It is impossible to overestimate the importance of this subject; the want of recognition of its importance is, in the writer's opinion, one of the causes of the very diverse differences of opinion entertained as to the beneficial or noxious influence of various dietetic substances.

The great fault to be found with soups that are served is that they are heavy, and contain too many ingredients. The average soup is made up with as many good things as possible, some to make it more nourishing, others to make it more palatable. This is all very well for the healthy, but where, as in gout, the digestive functions in the tissues and

* Sweetbread, tripe, chicken, rabbit.

alimentary canal are readily disturbed, simple soups are required.

The following highly nitrogenous soups are not, as a rule, suitable for the gouty: turtle, mock turtle, hare, kidney, oxtail, mulligatawny. If they are indulged in, the rest of the food and drink consumed at the same meal must be carefully limited.

Cocky-leeky, giblet, and hotch-potch are almost stews, and should be considered as a meat course. In not a few cases all of these highly nitrogenous soups are contra-indicated.

Roast beef and mutton bones boiled with vegetables, and the fat carefully removed, make a good stock from which soup can be made for the gouty. Excellent soup can also be made from the water in which meat or fish has been boiled.

The various vegetable purées—spinach, artichoke, tomato, carrots, green peas, etc.—are excellent for this class of patient. (For vegetable soup stock, see p. 386, and ch. xxii.) They are sufficiently sustaining to prevent a feeling of hunger, and if well digested give a fair amount of nourishment. In the case of soups made from the pulses, their high nutritive value should influence the rest of the meal, and in some cases they are better avoided.

Made-up meats are not suitable for the gouty, owing to the greater toughness of fibres induced by the second cooking, and also by the admixture of rich sauces of various kinds which are usually added for palatability. Meats should be tender and simply prepared. The best ways of preparing are (in order)—broiling, steaming, roasting, boiling, baking, stewing, and frying. The last mentioned should be avoided, especially in the case of beef and mutton. Although lamb and veal possess less extractives than other meats, and are on

that ground commendable, yet the gelatinous nature of the fibres makes them more difficult of mastication, and therefore less digestible. If allowed, this danger must be pointed out with a view to obviating it. Tripe, sweetbreads, kidney, and liver may be allowed for occasional use. Salted meats are rendered more indigestible in the preparation, and should, therefore, be avoided. Bacon and ham are more digestible than pork. With regard to game, white flesh is more suitable than brown, and water-birds are more fatty than other game.

Fish.—Fish are well calculated to form a large proportion of the dietary of the gouty. They contain on an average one-third less nitrogen than an equivalent amount of ordinary meat, and usually contain little or no fat. Fat fishes (salmon, mackerel, eels, pilchards, red mullets) are equal in nitrogenous value to an equal amount of moderate fat beef.

Milk and Milk Products.—As in the case of various other foods, there is much difference of opinion as to the value or necessity of a diet composed largely of milk, milk products, and vegetables. In many cases a course of a strict milk diet is the most suitable, particularly in young and otherwise healthy subjects, but it is much less suitable for adults and elderly subjects. Milk is highly nutritious, and when it is easily digested, and no undue fermentation processes are induced by its use, a limited course of milk diet is to be commended, the amount and duration being regulated by the effects on the digestive system and by the attitude of the patient towards it. With the active and fixed habits of adult life a meat-free diet is very rarely practicable, and is very seldom called for.

Cream, forming as it does the most appropriate form of fatty food in the dietary of the aged, likewise constitutes an

excellent form of fat administration in gouty subjects. It should preferably be taken with milk pudding or stewed fruit in an otherwise simple meal, or it may be used in the preparation of chicken cream, fish cream, or in various combinations with vegetables, when it takes the place of butter.

Skimmed milk is more digestible than ordinary milk in all cases where fat is not readily digested, but in recommending it as a beverage or food, regard must be paid to the amount of proteins and lactose present in it.

Whey is a useful article in many cases. It is a pleasant and stimulating drink, with a certain food value from the lactalbumin, lactose, and mineral matter present. In some cases whey with cream makes an admirable combination.

Cheese.—There is no reason why cheese should be forbidden. The ill effects frequently attributed to it arise from the manner in which it is taken, at the end of a meal already excessive and badly assorted. Being a rich, albuminous food, and varying in the proportion of fat present according to the variety of cheese, it should not be taken in large quantity; it should be well masticated, and it should be carefully distributed through the various vegetables or breadstuffs of the meal.

It is well to recommend patients who are very fond of cheese to partake of one of the softer varieties, as, although less digestible, they are much less likely to be taken to excess (see p. 44).

Eggs.—Eggs are an excellent dish for the gouty, and should form one of the staple breakfast dishes. They also constitute a very appropriate food constituent for the children of gouty parents, in whom the consumption of meat, and especially red meats, should be limited.

Carbohydrates, and especially those of the sugar group, are, as a class, to be regarded as more potent noxious agents than meat. A good rule with regard to them is to reduce the amount and simplify their form.

Sugar foods and dietetic accessories—for example, jams, marmalade, sugar, sweet cakes—are only to be partaken of occasionally, and in small quantity.

With regard to the strict vegetarian diet so eloquently advocated by Haig and others, the good effects undoubtedly derived in many instances depend, in the writer's opinion, on the simplicity of the whole diet, with the limited quantity of the chief nitrogenous ingredients, these being the two primary essentials in the dietetic treatment of confirmed gout. The following illustration may be given (Haig) :—

Breakfast.—One pint of milk, bananas, apples, pears, plums (fresh, dried, or cooked), any other fresh fruit. *Ad libitum.*

Lunch.—Vegetable soup, made with milk ; plate of potatoes (with butter, oil, or milk) ; two ounces of cheese, eaten with potatoes and any other vegetable in season ; stewed fruit or tart ; fresh fruit ; one pint of milk drunk during the meal.

Dinner.—Much as lunch ; one pint of milk ; one ounce of cheese.

A close analysis of this diet, which is recommended for a person in health, shows that it is not so simple as at first sight apparent; and while a diet for the gouty framed on very similar lines is undoubtedly a very beneficial method of treatment in some cases, in others it is altogether unsuitable.

Vegetables.—Popular belief, partly supported by medical opinion, condemns potatoes, but, if used in moderation and cooked and served with due precaution, there is no reason for prohibiting them, except in those special cases where they are definitely determined to be unsuited to the digestive capacity. When new and moist they are indigestible; the best form is a well-boiled, mealy potato in its skin, or the

same put through a potato-masher. A thoroughly well-baked potato is also good. When fried, or roasted in mutton dripping, or mashed with milk and butter, they are unsuitable in most cases. The other root vegetables—for example, turnips, carrots, parsnips, radishes, beetroots (also rich in sugar), artichokes, also cabbages, curly greens, brussels sprouts, broccoli, and the green of cauliflower—should only be taken in small amount on account of their tendency to induce flatulence. The following are more suitable: spinach, flower of cauliflower, savoys, endive, lettuce, watercress, kale, leeks, onions, celery, cucumber, vegetable marrow, green peas, French beans. Asparagus has been condemned by some writers on account of the nucleins in the young shoots; also tomatoes and sorrel on account of the acids present; but, as most typically gouty subjects can partake of them freely, it is probable that these objections have only theoretical importance.

The green vegetables above mentioned can be freely partaken of in the form of salads, provided oily dressings and hard-boiled eggs are avoided. Mushrooms and truffles and other fungi are quite permissible in small quantities. The pulses (lentils, peas, beans, haricot beans) are not, as a rule, advisable, because it is not an easy matter to make the patient realize that their nutritive value is such that their use must influence markedly the amount and quality of the other articles consumed.

With regard to puddings, the simpler the better. Milk puddings, such as rice, sago, semolina, ground rice, etc., should be made without eggs in many cases. Suet puddings of all kinds are as a class to be avoided, but if made largely with bread-crumbs in place of flour, well boiled, and unaccompanied by a heavy sauce, they may be taken. A list of starch-free puddings is given on p. 433. If custards and

omelets, sweet or savoury, are taken, the nutritive value of the eggs must be recognized. Jellies, blancmanges, lemon sponge, and creams may be taken in very sparing amount, and, as with other foods, discretion is necessary. Fruits of all kinds in themselves are permissible, but must be taken with caution, especially in later adult life, and it is well to bear in mind the old saying—"Fruit is golden in the morning, silver at midday, and lead at night." Much depends on the amount of sugar used in the cooking, and the accessories used at table. Crystallized fruits are quite unsuitable on account of the large amount of sugar present. For the same reason, special care has to be taken with regard to dried fruits, such as plums, raisins, dates, and figs.

Beverages.—To the confirmed gouty subject the question of what he may drink is sometimes a more important one than of what he may eat.

Like the question of diet, it is impossible to lay down definite rules applicable to the disease. Everything depends on the age of the patient, his constitution, his previous history as to consumption of fluids of different kinds, the nature of the symptoms, and the reaction of the tissues to various fluids. Specially is this so with the use of alcoholic stimulants. While there is no doubt that the subjects of inherited gouty tendencies are better without any form of liquor, this is sometimes not so in the case of the patients more or less habituated to the use of stimulants. In judging of the suitability of the various liquors, we must have regard to the usual methods of preparation of the individual beverages—for example, beer, claret, champagne, etc.—and to their common defects as recognized by experts in the trade (see p. 115 *et seq*). The decision as to what any given subject can take may only be arrived at after careful study of the history, diet, and state of muscular activity in each

case. There is no doubt that *malt liquors* and *sweet wines* are much more injurious than other liquors.

The sweet wines include champagne, Madeira, port, sherry, malmsey, and Tokay; also porter, ale, and cider. Burgundy, Bordeaux, Rhine, and Moselle are almost void of sugar, and are therefore more suitable. The greater acidity of Burgundy and the Rhenish wines makes them, on the whole, less suitable than claret and Moselle wine.

German beer—for example, lager—can frequently be taken with impunity when even one glass of the British beers will induce some acute disturbance.

The free consumption of water can be safely recommended to many, but not to all, gouty subjects. In the case of stout adult plethoric subjects it may be advisable to restrict its use to early morning and late evening. The water is, as a rule, best taken on an empty stomach. Tea, coffee, and cocoa, when suitably prepared, may be taken in moderate amount, but idiosyncrasies in their use are often encountered. Cocoa disagrees with some gouty subjects, while with others the daily consumption of coffee is soon followed by some digestive disturbance, and in these cases special restrictions are called for. The amount of sugar allowed should be small. All sweet beverages should be restricted or cut off, more especially if they are, in addition, aerated. The daily administration of an alkaline or mineral water is a point of great importance in the management of many gouty cases.

The following general rules may be laid down:—

1. When a hereditary tendency exists in children, habits of extreme sobriety in eating and drinking should be cultivated, and the diet should be mainly a milk, vegetarian, and light meat one. (See also p. 221.)

2. When the disease is established there is no routine treatment, and the details will not be the same in any two

cases. Attention should, however, be directed in turn to the following:—

(*a*) The diet and state of the digestive tract.
(*b*) The amount and nature of the exercise indulged in.
(*c*) The functional activity of the skin and kidneys.

3. The quality of food should be determined by the amount of active exercise. Three meals a day only to be taken, and those to be of a simple character.

4. When in doubt as to which set of food constituents to cut off, begin with the carbohydrates, and especially the sugar substances. In not a few cases the latter may require to be completely cut off, and in every instance special care must be exercised in the admixture of carbohydrates with the fats and meaty foods.

5. Thorough mastication of the food is all-important, and strict attention to the evacuation of the bowels a necessity (with the addition of an occasional saline).

6. *Fluids and Beverages.*—(*a*) Alcohol in any form is better avoided, except in subjects who are more or less habituated to its use, in which case the liquor taken should be the one which is known by the patient to be least detrimental to him. On no account should drinks be mixed. All sweet wines and malt liquors should be avoided, unless the patient is satisfied from careful observation that these are not prejudicial to him. The stimulant should be taken in a measured quantity and with meals.

(*b*) The free use of the alkaline table waters is to be commended, care being taken that an excessive amount of fluid is not taken with the meals.

(*c*) A tumblerful of hot water at night and an occasional course of mineral waters taken on an empty stomach are useful eliminants.

II. CHRONIC RHEUMATISM AND RHEUMATOID ARTHRITIS.

Chronic rheumatism manifests itself at different periods of life, and in a variety of ways. It may take the form of stiffness and pain in the affected tissues, which may become swollen, the pain and stiffness being worse in the morning and disappearing in whole or in part with exercise. It may take the form of a troublesome lumbago, neuritis, or sciatica. In other cases it affects chiefly the muscular and fibrous tissues, notably in the neck, thighs, and calves of the legs, and is then characterized by the presence of localized areas of swelling, pain, and tenderness in the affected parts. In whatever form the disease manifests itself, it arises from the absorption of and deposit in the tissues of the rheumatic poison, which is probably microbic in origin, the source in many cases being the digestive tract.

Rheumatoid arthritis is a special form of rheumatism which attacks young people, adults, and elderly subjects, and its onset may be acute, subacute, or chronic. It affects many joints, notably those of the hands, feet, and knees. The exact causation of this disease is also unknown, but there is good reason for believing that it too is of bacterial origin, the main sources of the infection being the digestive tract, including the mouth and throat, and the genito-urinary tract. In support of the fact that the digestive tract is in many cases the source of the toxæmia, both in rheumatism and rheumatoid arthritis, we have the fact that the stools are frequently deranged, being for the most part ill-formed and extremely fœtid. In some cases constipation is a prominent feature, and we know that by correcting this by means of diet and other measures there is a corresponding improvement in the symptoms, and frequently an arrest or cure of the

disease. The diet must be altered in a manner which will lead to a more satisfactory state of the intestinal contents, as revealed by the passage of healthy stools.

The diet appropriate to any given case can only be determined after a careful inquiry has been made into the past history of the case. There is good reason to believe that a diet which is rich in meat and other rich albuminous foodstuffs promotes the multiplication of the intestinal bacteria in a manner favourable to the development of rheumatism. Hence it is important in many cases to reduce the amount of meat, and more especially red meat, and further, to see that the meat when given is given in a simple and easily digested form. There are some cases, however, which are beneficially treated in the early stages of the disease by a protein dietary, the protein being given in a simple and easily digested form (see "Protein Dietary," pp. 299, 326). We also know that a diet which is rich in vegetables, and especially green vegetables, leads to the formation of organic acids in the intestinal tract which exercise a restraining influence on the bacteria in the bowel. On these grounds a lacto-vegetarian diet is often the most suitable. (See p. 327.) Great care has, however, to be taken in the selection of this diet, because of the flatulence and other disturbances that may be induced by a too largely vegetarian régime. Again, we know that the digestive secretions are, as a rule, weakened in this disease, and hence the diet must be framed in such a way as to throw the minimum strain on the digestive functions while supplying ample nutritious material for the needs of the tissues. Hence the diet should be simple, the proteins, fats, and carbohydrates all being presented in a form which is easily digested and assimilated.

Excess of sugar, etc.—such as is involved in taking four or five cups of tea daily with much sugar—also marmalade,

jams, sweets, and chocolate, may induce rheumatism, through the bacterial fermentation set up in the digestive tract; excess of sugar and acids in fruits may similarly induce the condition. No hard and fast rules can be laid down. In the investigation of rheumatic cases, careful attention must be directed to the dietary of the patient for a long time prior to the development of rheumatic symptoms. Has the patient indulged too freely in animal "protein" foods?—for example, indulging in a rich red meat diet twice or thrice daily. Has he been in the habit of taking a large amount of sugar, in the form of sugar in his tea, jam, fruit, and the like? Has he partaken of beer or other alcoholic liquors to an extent which is prejudicial to him?—for example, taking a little beer daily to lunch over a lengthened period, when leading a comparatively sedentary life. And lastly, has there been in operation any contributory factor, such as constipation or septic condition of the teeth, the existence of which would be important contributing factors? In some patients it is a useful plan to give for two or three days at the outset of treatment nothing but skimmed milk and buttermilk.

Most stages of rheumatism can, in their early stages, be cured by correction of these faults. In conclusion, one may formulate the following rules:—

1. The *diet should be simplified*, taken at regular intervals, and eaten slowly. All extras such as sweets, sauces, wines, and malt liquors should be withheld. When the digestion is good and the appetite strong a large amount of food may be taken, provided it be of a simple nature. Special care must be taken to prevent constipation.
2. Any *article of food or drink indigestible to the patients* should be withheld or taken in sparing amount. In this connection it is important to note the periodic

nature of the symptoms—for example, recurrence of "rheumatism" at the fruit season.

3. *More fluid* should be taken. Most rheumatic subjects drink too little. Plain water, hot water night and morning, or Lithia water, to the extent of about 15 to 20 ounces (two tumblerfuls), should be taken daily on an empty stomach.

Two illustrative dietaries are given. The first of these (*a*) is suitable for many patients whose rheumatism is the result of abnormal fermentation from long continued excess of starchy foods; the second (*b*) is appropriate to other patients whose rheumatism arises from abnormal putrefaction from excess of meat foods.

Diet for Rheumatism associated with Intestinal Fermentation.

(*A.*)

Tumblerful of hot water on waking (no early tea).

Breakfast.—Cup of tea or coffee with milk, no sugar and no cream. Slice of freshly made thin toast or crisp roll and very little butter. One course from the following—take a good helping of cold ham or cold tongue or potted meat, fried or toasted bacon, or grilled kidney. *Fish*—white, or of the smoked varieties, plainly cooked. *Eggs*—plain boiled, poached, or scrambled, or as an omelet (not fried).

Eleven a.m.—"Soured" milk, 8 oz., with a small piece of sweet spongecake or biscuit.

Lunch.—One course: choice from fish, chicken, game, chop, steak, roast beef, or mutton, plainly cooked; ½ slice of toast; no vegetable; biscuits or dry roll with cheese and butter; cup of coffee.

Four-thirty p.m.—Cup of "soured" milk, with spongecake or biscuit, may be followed by a cup of freshly made tea with milk, not cream or sugar, and no more bread-stuff.

Dinner.—Clear soup (from meat stock, not thickened). Meat course: choice as at lunch; no vegetables or rich sauce. Pudding selected from custard, baked or boiled, curds, jelly, fruit soufflé, cream; stewed fruit, very little sugar; and no coffee.

Ten p.m.—Drink of hot water.

Diet for Rheumatism associated with Intestinal Putrefaction.

(*B.*)

Seven-thirty a.m.—Tumblerful of hot water.

Eight-thirty a.m.—*Breakfast* (vegetarian), 1 cup of tea or coffee. Toast or roll with butter, a little marmalade or jelly. Cereal porridge, oatmeal, barley meal, hominy, flaked rice, to be taken with cream. Some fresh fruit.

Eleven a.m.—Glass of "soured" milk and sweet biscuit.

One-thirty Lunch.—An egg in some form, or vegetarian dish. Omelet, soufflé, savoury or cheese custard, cauliflower *au gratin*, tomato savoury, macaroni cutlets or cheese. Plain milk pudding with cream.

Four-thirty p.m.—Cup of "soured" milk and spongecake, with 1 cup of tea.

Seven p.m. Dinner.—Soup from vegetable stock, or milk, tomato, artichoke, potato, lentil, onion. Fish occasionally; egg in some form, or vegetable savoury. Pudding: simple pudding or stewed fruit; no savouries and no coffee.

Ten p.m.—Tumblerful of hot water.

XVIII.

DIABETES.

FOODS ALLOWED TO THE DIABETIC.

Milk.
Fat.
Breads.
Starch-free Breads.
Porridge or Gruel.
Puddings, etc.
Home-made Diabetic Bread Foods.
Fruit.
Vegetables.
Beverages.

Chapter XVIII.

DIABETES.

In diabetes there is a defect in the digestion and absorption of carbohydrate foods, with the result that *sugar appears in the urine.* It may be of a mild or a severe type; in the former, the sugar may be very small in amount, and its presence in the urine may give rise to few or no symptoms, and the sugar in the urine can be made to disappear by restricting the sugars and starches of the food; in severe cases the sugar is large in amount, and its presence is associated with the characteristic symptoms of thirst, tiredness, loss of weight, and the passage of a large amount of urine. In these cases sugar may continue to be excreted in the urine even although the diet is almost free of sugar and starchy food. The main essential in treatment is to *restrict as far as possible the amount of carbohydrates*—sugar and starches—in the diet. This involves the use of foods rich in proteins and fats. The deprivation of starchy foods in the form of bread and bread-foods is a great trial to the patient. Unfortunately, most of the substances prescribed as diabetic foods are not very palatable; they are, further, expensive, and to many the strict diabetic diet becomes so irksome that the restrictions of the dietary have to be relaxed. The type of the disease has also to be considered. Thus the dietetic treatment of diabetes

in a stout elderly subject is a simpler matter than the treatment of the severe form of the disease met with in young subjects in whom there is much wasting and general weakness. The list below gives the permissible foods, and upon this the menus have to be framed. It is unfortunately almost impossible to give a satisfactory diabetic diet that is not expensive.

FOODS FOR THE DIABETIC.

Foods.

May Eat.	May not Eat.
Butcher meat of all kinds except liver.	Sugar in any form (saccharin or saxin may be used as sweetening agents to replace the sugar).
Tongue, ham, bacon, or other smoked, salted, dried, or cured meats.	Wheaten bread, and ordinary biscuits of all kinds.
Poultry, game.	Toast, rice, arrowroot, cornflour, oatmeal, sago, tapioca, macaroni, vermicelli.
Fish of all kinds, salted, fresh, or cured; shellfish, except the bodies of lobsters and crabs; mussels.	Potatoes, carrots, parsnips, beetroot, peas, Spanish onions.
Animal soups, not thickened with any starchy materials; beef-teas and broths.	Pastry and puddings of all kinds, and honey.
Eggs dressed in any way.	All fruit, fresh and preserved, except lemons and unripe fruit.
Cheese, cream cheeses, butter, cream.	Liver.
Greens, spinach, turnip-tops, French beans,* brussels sprouts,* cauliflower.*	Oysters.
Broccoli,* cabbage,* asparagus,* seakale,* vegetable marrow, lettuce, cucumber, tomatoes, mushrooms, mustard and cress, watercress, endive, spring onions, leeks, celery, rhubarb, pickles.	Cockles, mussels, and crabs.

* These should be boiled in a large amount of water.

May Eat.	May not Eat.
Oil, vinegar.	
Savoury jelly; jellies and custards, sweetened with saccharin; blanc-manges, made with isinglass or gelatine.	
All nuts, except chestnuts; olives.	

Beverages.

May Take.	May not Take.
Tea, coffee, cocoa from nibs, dry sherry, claret, dry Sauterne, Burgundy, Chablis, hock, brandy, whisky, and other unsweetened spirits; unsweetened aerated waters; milk (limited to 1 or 1½ pints daily); kephir, sugar-free milk.	Milk, except in limited quantities; sweet ales, porter, stout, cider, all sweet wines, port, Tokay, champagne; liqueurs; fruit juices and syrups; cocoa and ordinary chocolate.

Milk is allowed only in small amount. The carbohydrate present in milk—lactose—is more easily digested than other forms of carbohydrates, and in severe forms of diabetes it is sometimes the best food, on account of its protein, its richness in fat, and the solubility of its sugar. If milk is considered inadvisable, an artificial milk can be procured free from sugar (from Messrs. Clay, Callard and Co., Regent Street, London); this can be diluted with mineral water. **Cream** has mainly to replace milk in the special cookery, being almost free from lactose, and it has the great advantage in containing the most easily digested form of fat (see p. 40).

The following recipe of home-made artificial milk prepared from cream can be taken in unlimited quantity by diabetics, and is a useful article of food :—

Sugar-free Milk.

Place 4 tablespoonfuls of cream in 1 pint of water. Mix well. Allow to stand for 12 hours. Then skim off the fat and place in a

second vessel; to this add water (cautiously), a pinch of salt, a trace of saccharin, and a little white of egg, until the fluid has the consistence and colour of ordinary milk.

A second form of milk, containing only a little sugar, may be made by dissolving cream, and especially Devonshire clotted cream, in water.

A third artificial milk, practically free from sugar, can be made from biogene powder and milk albumin (Bonthron, 50 Glasshouse Street, London), as follows,—

To a glass of water a teaspoonful of cream and one or two tablespoonfuls of biogene powder is added, and well mixed.

Fat.

The supply of abundance of fat is often a difficulty, but fish and vegetables should be cooked and served with a liberal amount of butter. Many patients can readily take the fat of cold roasted beef, and ham, or bath chaps (pig's cheek); and large quantities of fatty food can be taken in this way. Bone-marrow, which consists almost entirely of fatty material, may be used in the form of potted meat or grilled marrow bones (ch. xxii.).

Salmon, herrings, mackerel, sardines in oil, pâté de foie gras, cream cheeses, rich sauces made with eggs, oil, and cream (for example, mayonnaise), are all useful. If the excess of fat in the food gives rise to dyspepsia, a small quantity of brandy and water after meals aids digestion.

Breads.

Diabetic Breads are made from bran, gluten, casein; and in recent years the oily nuts—such as almond, cocoa-nut, hazel nut, and the soya bean—have been largely used. The made-up breads, cakes, and biscuits can be procured direct from the makers (Blatchley, London, and Callard and Co., London); or the ground nuts, etc., in the form of flour, can be purchased and made up in the patient's own house.

Almond flour or desiccated cocoa-nut powder made into biscuits is very satisfactory, and they contain a considerable quantity of fat. These both contain a little sugar, which is destroyed by the action of yeast in the preparation of the foods. Cocoa-nut, hazel-nut, and pine seeds can also be procured in powder form, and made into biscuits and flavoured in various ways. Bran flour is another product which, if carefully prepared, is entirely free from starch; this can be bought by the pound, and made at home into bran cakes of bread.

Diabetic foods are either made up by the manufacturers or made at home from the specially prepared flours, as follows.

The following albumins may be used for the preparation of bread substitutes, puddings, etc., or in the cooking of food in place of bread-crumbs:—

Vegetable Albumins.—(1) Gluten flour, best specimens only contain 2 to 3 per cent. starch (as supplied by Messrs. Bischof and Brooke, 35 Brooke Street, Holborn, London, E.C.); (2) Glidine contains only 2.7 per cent. starch, or less (Messrs. Menley and James, Farringdon Road, London, E.C.); (3) Aleurent contains only 7 per cent. of carbohydrates (Messrs. Callard, Regent Street, London).

Milk Albumins (all starch free).—Protene (the Protene Co., 36 Walbeck Street, London, W.); plasmon (Plasmon Co., 56 Duke Street, Grosvenor Square, London); biogene (Mr. Bonthron, 50 Glasshouse Street, London).

Meat Albumins.—Sanatogen (the Sanatogen Co., 12 Chenie's Street, London, W.C.).

There are few specimens of gluten flour (such as preparations supplied by Messrs. R. O. Bischof and Brooke, 35 Brooke Street, Holborn, London, E.C.; and by J. Bonthron and Co., and Callard and Co., London, W.) which contain only 2 to 6

per cent. of starch. When the medical man has ascertained, by his own testing with iodine, that the gluten flour contains only a very small percentage of starch, it may be used freely for the preparation of bread, puddings, pancakes, according to directions supplied by the various firms (provided these directions do not recommend the addition of ordinary flour).

Bread Substitutes which are free from Starch and satisfactory chemically.

1. From Bonthron, 50 Glasshouse Street, London—
   Casein biscuits (these are very palatable).
   Casein bread.
   Shortbread biscuits and Biobran drops.
   Biogene wafers.

2. From Callard and Co., Regent Street, London—
   Prolacto bread. | Bran and almond bread.
   Cellulon bread. | Kalari biscuits.
   Casoid bread. | Rislacto biscuits.
   Casoid meal bread.

3. From Protene Co., 36 Welbeck Street, London—
   Protene bread. | Protene bran bread.
   Protene biscuits.

4. From Plasmon Co., 56 Duke Street, Grosvenor Square, London—
   Plasmon diabetic biscuits.

5. From Huntley and Palmer, Reading—
   Akoll biscuits.

6. From Messrs. R. Summer and Co., of Liverpool—
   Titrumen bread. It is claimed that each roll contains as much assimilable albumin as 3 oz. of meat or 4 eggs.

7. Brusson Jeune Co., Bedford Chambers, Covent Garden, London—
   A crisp roll, not entirely free from starch, which is an excellent diabetic food.

A few directions for making porridge and puddings are here given.

Porridge or **Gruel** made from almonds or cocoa-nut can be prepared in the following manner :—

A small piece of German yeast (the size of two peas) is dissolved in a little lukewarm water, and added to and well mixed with two teaspoonfuls of ground almonds. The mixture is allowed to stand in a warm place (by the fire) for half an hour or longer. The small quantity of sugar in the almonds is mostly or entirely destroyed by the action of the yeast, and the mixture becomes spongy. It may be sweetened with a trace of saccharin if desired. The consistence will vary according to the quantity of water which has been added. If the consistence is that of custard or rice pudding, the almonds may be eaten with stewed cranberries or other fruit as a pudding. Or a little more warm water, or warm water and cream, may be added and the mixture will have the consistence of porridge and milk, and may be taken in place of oatmeal porridge. By adding still a larger quantity of water, a mixture like gruel may be made. Desiccated cocoa-nut powder may be used in place of ground almonds, and cocoa-nut pudding, porridge, or gruel may be thus prepared. The almond and cocoa-nut porridge and gruel are of great nutritive value on account of the large amount of fat they contain.

Puddings, etc.

The following are some of the simpler puddings, which are very suitable :—

Cocoa-nut Pudding.

Half ounce of German yeast is mixed in a little lukewarm water with ¼ lb. of desiccated cocoa-nut powder. The mixture is kept in a warm place for fifteen minutes. Then ½ oz. butter, a pinch of salt, and a little milk are added. All must be well mixed. The mixture is placed in a pudding-dish, and baked in a moderate oven for twenty or thirty minutes until the surface is brown. This pudding can be eaten warm or cold. It may be taken with custard, and sweetened, if desired, with saxin.

Almond Pudding.

Take 4 oz. of ground almonds. Mix a ½ oz. of German yeast with a little lukewarm water. Add the ground almonds to the yeast and

water, and mix well. Allow the mixture to stand in a warm place for fifteen minutes until spongy. Beat up one egg in a little milk, and add a little solution of saccharin. Then mix the egg with the ground almonds, place in a pudding dish, and bake for about fifteen minutes.

Suet puddings or suet and almond pudding, and especially custard (made in the old-fashioned way from eggs and milk, and not from custard powder), are very suitable. To sweeten the custard or puddings, saccharin may be used.

Suet pudding may be prepared from a milk albumin (pastry flour) obtained from Messrs. Callard and Co. Directions are supplied along with the powder.

Sweets for dinner—jellies, ices, creams, etc.—almost free from carbohydrates, may be prepared by an intelligent cook from cream, eggs, butter, almonds, nuts, lemon, gelatine, vanilla, wine, and brandy, and sweetened with saccharin or saxin.

Home-made Diabetic Bread Foods.

Cocoa-nut or Almond Cakes.

4 oz. desiccated cocoa-nut or almond flour.
Pinch of saccharin.
German yeast.
1 egg.
2 teaspoonfuls cream.

Method.—The almond flour is mixed into a paste with a little water and the German yeast. Allow the mixture to stand in a warm place for twenty minutes. Then add the egg, two teaspoonfuls of cream, and water sufficient to work the mixture. Divide into cakes and bake in a quick oven.

Bran Bread.

½ lb. bran (prepared).
2 oz. almond flour.
3 oz. of butter.
6 eggs.
½ pint milk.
2 teaspoonfuls bicarbonate of soda.
1 teaspoonful of tartaric acid.

Method.—Place the butter in a basin and beat it to a cream, then add the almonds and beat well; add the eggs one at a time. Partly mix the bran before adding the milk. Well mix the whole together, and place it in a well-buttered tin, and bake for an hour in moderate oven.

Gluten Bread.

1 lb. gluten flour.
¼ lb. of prepared bran.
1 oz. yeast.
1 oz. ground almonds.
2 eggs.
Pinch of salt.

Method.—Make a sponge as for ordinary bread, and set it to rise. This will take about three-quarters of an hour. Then bake.

The addition of a little ground almonds and two eggs is an improvement.

Gluten bread in slices, cut into small pieces, soaked in butter and toasted or fried, is very palatable, and will be found a useful article in the preparation of many dishes.

Protene Bread.

4 oz. of No. 2 Protene,* 2 oz. of butter, 2 eggs. Beat all together thoroughly. Divide so as to form eight small cobs. Bake in oven.

Protene and Cocoa-nut Bread.

Mix together 1 tablespoonful of lukewarm water, ¼ oz. of German yeast, 3 tablespoonfuls of desiccated cocoa-nut powder. Cover and leave in a warm place for about twenty minutes until it is spongy ; then add three tablespoonfuls of bran protene, a pinch of salt, 1 egg well beaten up with a little milk. Mix all well together, place into tins, bake twenty minutes or longer.

Cocoa-nut and Plasmon Cakes.

Mix together 2 tablespoonfuls of cocoa-nut powder with a little luke-warm water, and ¼ oz. of German yeast, so as to form a stiff paste. Allow to stand (covered) in a warm place for about ten minutes, until it becomes spongy, then add 3 tablespoonfuls of plasmon, a pinch of salt, 1 tablespoonful of glycerine, and 1 egg well beaten up with a little milk. Mix all together. Divide into four to eight tins. Bake for twenty minutes or more.

Protene and Almond Bread.

Mix ¼ oz. of German yeast with 2 tablespoonfuls of lukewarm water, and 1 oz. of almond flour (ground almonds). Allow the mixture to

* No. 2 Protene can be obtained from the Protene Co., 36 Welbeck Street, London, W.

stand in a warm place for ten minutes, then add 4 oz. of No. 2 Protene, 1 egg (beaten up), a little salt, 1½ oz. of butter, and a little milk. Mix all well together with a fork, divide into cobs, or place into small tins, and bake.

Plasmon Biscuits.

Plasmon 8 oz., 1 egg beaten up in milk. Mix well together into a light paste. Divide into cakes and bake for ten minutes.

Most gluten bread contains so much starch that it is of little service. It should always be tested with iodine, and should be regarded as ordinary white bread, unless it is known to be one of the few specimens containing only a very small percentage of starch. When it is considered advisable to allow a diabetic patient a small quantity of white bread—3 or 4 oz. daily—this may be replaced by an amount of gluten bread containing the same quantity of starch as the 3 oz. of ordinary bread. The bulk of this quantity of gluten bread will be much greater than that of the equivalent white bread. Many patients much prefer the small quantity of ordinary bread to its more bulky equivalent of gluten bread, but to some patients the more bulky gluten bread is more satisfying.

Diabetic spongecakes, made from almond flour and sweetened with glycerine, may be commended.

Gluten macaroni and gluten vermicelli are quite appetizing articles.

As a matter of practical experience in the treatment of diabetes, the complete deprivation of starch in the bread-stuffs is found to be so great a trial, and becomes so irksome, that it is usually necessary and often desirable to allow a small amount of ordinary bread.

Fruit.

Fruit when ripe, as a rule, should be avoided because of the large amount of sugar present; but in a few fruits—strawberries, gooseberries, apricots, melons, and oranges—the sugar is in the form of levulose, and this, as has been mentioned before, is more easily utilized by the tissues. Unripe fruits, gooseberries and raspberries, cranberries and rhubarb, sweetened with saccharin or neutralized with an

alkali, have to take largely the place of ripe fruit. The "Forbidden Fruit," resembling a pale orange, contains very little sugar, and is suitable for diabetic patients. Diabetic marmalade, made with gelatine, glycerine, and orange juice and rind, is an attractive-looking compound, and a great boon to the diabetic's breakfast table. Callard and Co. also make a diabetic jam which is almost sugarless.

Vegetables.

Potatoes should not be taken by most diabetic patients; if taken, they are best in the form of well-fried potato chips. A small amount of potato in this form makes a large dish, as the potato expands with cooking.

In cooking green vegetables, butter and fat should be freely used; and oil, eggs, and cream may be used with the salad dressings.

Beverages.

Beverages containing carbohydrates to any degree should be excluded from the dietary. These include beer, porter, ale and stout, rum, sweetened gin, liqueurs, sweet lemonade, cocoa and chocolate, fruit wines and syrups, port, champagne, sweet wines, and Tokay. The beverages allowable are water, soda-water, and mineral water, tea, coffee, brandy, whisky, dry sherry, claret, Burgundy, hock, Moselle, most Rhine wines, and Hungarian wines. Citric acid lemonade, 10 grains to the pint, sweetened with 4 drams of glycerine or a little saccharin, is an admirable thirst-quencher, and the following are also suitable :—

Home-made lemonade, lemon juice and water, sweetened with saccharin or saxin.

Soda and Lemon.—Squeeze a lemon, and add a glass of soda or Seltzer water.

A specially prepared *diabetic cocoa;* and also chocolate

is prepared, flavoured with vanilla and sweetened with saccharin.

A series of menus for six days are here given. The beverages must be selected from those given on p. 333. The bread foods must be selected from the different preparations given in the preceding pages; sauces must be made without flour; those on pp. 422, 423 can be recommended.

I.

Breakfast.	*Lunch.*	*Dinner.*
Fried fillet fish served with lemon juice. Savoury omelet. Diabetic bread or toast.	Lemon drink sweetened with saxin. Vegetable marrow stuffed (p. 431). Cold ham. Cream cheese. Almond and bran biscuits; gluten rolls.	Soup with vegetables. Halibut with lemon. Fillet of beef and cauliflower. Green apples stewed. Pancakes made from gluten, flour, milk, eggs, sweetened with saxin. Cheese, eggs.

II.

Egg boiled. Toasted sardines rolled in bacon, or fried. Gluten bread, butter.	Fried bacon on purée of spinach. Cauliflower *au gratin.* Gorgonzola cheese. Gluten dinner rolls.	Tomato purée. Steamed sole with sauce hollandaise. Boiled fowl. Carrageen jelly (pp. 421, 430). Stuffed tomatoes.

III.

Broiled kippered salmon. Scrambled eggs on toasted bran bread. Gluten flour bread.	Chicken panada. Potted veal. Imperial cheese. Gluten cracknels and scones.	Chicken broth (strained, thickened with cream). Fish soufflé, curry and French beans (no rice). Gluten and almond pudding. Anchovy toast.

IV.

Breakfast.	*Lunch.*	*Dinner.*
Grilled kidney and bacon. Crab omelet. Bran bread. Cocoa-nut biscuits. Butter.	Potted herrings. Cold meat and tomato salad (p. 424). Pâté de foie gras with bran biscuits.	Consommé with custard. Salmon mayonnaise and cucumber. Sweetbreads and tomato. Curds and cream. Mushrooms *au gratin.*

V.

Findon haddock stewed in butter. Poached egg on spinach. Almond loaf. Gluten cracknels. Butter.	Roast chicken and watercress. Stewed cucumber and cheese sauce. Stilton cheese. Pine kernel biscuits. Toasted gluten flour bread.	Purée spinach or lettuce. Turbot. Game—pheasant with stewed celery. Blancmange (p. 421; use saccharin instead of sugar). Tarragon creams (p. 433).

VI.

Cutlets of egg, ham, or crab. Camp pie. Gluten and bran bread.	Roe soufflé (p. 433). Smoked tongue and salad. Egg in aspic.	Tomato soup. Whitebait with sliced lemon. Roast lamb, mint sauce. Asparagus. Gooseberry fool. Hot caviare on gluten toast.

XIX.

OBESITY.

Cause.

Principles of Dietetic Treatment.

Remedies to be avoided.

How to get Fatter.

Chapter XIX.

OBESITY.

CAUSE.

Obesity results from the excessive consumption of certain foods which are fat forming. Fat is a carbon mixture. All the food-stuffs—namely, proteins, fats, and carbohydrates—contain carbon, but fat is chiefly formed from the fats and carbohydrates in the diet, and of these the most important clinically are the carbohydrates. The chief function of carbohydrates and fats is that of energy producers, and all the excess of these foods above the bodily requirements is stored up in the tissues of obese subjects as fat. Contributory factors are lack of exercise, and excessive indulgence in wines and malt liquors. A vicious circle is often set up: lack of exercise tends to promote obesity; obesity still further restricts the active bodily movements which are so essential for good health.

The following table is a useful one, indicating what should be the relative weight and height of a person at adult age in good health. On the higher scale a certain percentage is allowed for differences in build, size of bones, etc. A weight beyond the extreme means diminished respiration and impeded action of the heart, conditions incompatible with robust health and condition :—

Normal Weight.						Extreme Limit.			
Stature.		Male.		Female.		Male.		Female.	
ft.	ins.	st.	lb.	st.	lb.	st.	lb.	st.	lb.
5	0	8	4	7	9	8	11	8	1
5	1	8	9	7	12	9	2	8	4
5	2	9	0	8	2	9	6	8	7
5	3	9	7	8	8	10	0	9	0
5	4	9	13	9	2	10	6	9	7
5	5	10	2	9	8	10	10	10	0
5	6	10	5	9	13	11	0	10	7
5	7	10	8	10	5	11	5	10	13
5	8	11	1	11	0	11	10	11	4
5	9	11	8	11	6	12	2	12	0
5	10	12	0	11	10	12	9	12	6
5	11	12	6	12	2	13	3	12	12
6	0	12	10	12	8	13	12	13	4

PRINCIPLES OF DIETETIC TREATMENT.

The *first essential in treatment is to greatly reduce the amount of fat-forming foods.* These are not required. When these are cut off, nature draws on the reserve fat in the tissues, until that which is superfluous is gone. By this means we reduce the total amount of energy taken in the form of food. At the same time *combustion in the tissues must be promoted* by increased physical exercises carried out at home daily under directions. A third important factor in treatment is to *promote the activity of the skin* by a carefully planned course of baths, which must be taken with special precautions in the case of very obese subjects. All the dietetic systems of treatment of obesity are founded on the above principle, the best known system being that of Banting, who in the year 1863 reduced his weight by 44 lbs., and without any recurrence of corpulence when ordinary diet was resumed. His diet—consisting of animal food 13 to 16 oz., bread 2 oz., fruit and vegetables 6 to 12 oz.; total fluid restricted to 35 oz.—was made up as follows:—

Breakfast.—5 to 6 oz. of animal food; meat except veal and pork; boiled fish or kidneys; 1 oz. of toast or biscuits; 9 oz. of tea without milk or sugar.

Dinner.—5 to 6 oz. of lean meat, poultry, game, or fish; eels, salmon, and herring are excluded; every vegetable except potato, parsnips, beetroot, turnip or carrot; cooked fruit unsweetened; 1 oz. dry toast; 10 oz. of good claret, sherry, or madeira.

Tea.—9 oz. of plain tea without sugar or milk; 2 or 3 oz. of cooked fruit; a rusk or two.

Supper.—Meat or fish, as at dinner, 3 to 4 oz.; claret or sherry and water 7 oz.

An interesting and useful account of the régime in vogue at Carlsbad is given by Mrs. Ernest Hart. Mrs. Hart gives her personal experience as follows: "It may be of interest to my readers, who suffer from too great an abundance of fat, to learn how I put theory into practice and reduced my weight 15 lbs. in three weeks. This result was obtained at Carlsbad, and the régime was a follows:—Rose at six, took three tumblers of hot Sprudel water, walking for about twenty minutes between each glass. Breakfast at eight, consisting of one or two small crescents of bread and a boiled egg. On alternate mornings a vapour bath with cold douche, or general massage of the body. Dinner at one o'clock, consisting of a small amount of fish and meat or poultry, with green vegetables; no potatoes or sweets. In the afternoon a walk of from six to eight miles up the hills in a flannel dress. Supper at seven, consisting of a poached egg or a small cut of cold meat. There is no doubt that I suffered from constant hunger on this diet, but under it my weight steadily diminished, and a feeling of lightness and well-being took the place of previous heaviness. Continuing the diet after I left Carlsbad, I lost another six pounds, and it was some years before the tendency to increase in weight showed itself again. I am quite certain that no one need fear be-

coming a ponderous size, a source of discomfort to themselves and of disagreeable impression to others, if they checked the beginning of obesity by suffering the small inconvenience of submitting to a restricted diet for a time."

Other systems of dietetic treatment, such as a modification of the Salisbury diet (p. 297), and a milk diet cure with rest and massage, should only be carried out under strict medical supervision.

With regard to the taking of fluids in obesity, there is no doubt that the amount of fluid taken with meals should always be restricted, and to this end soups are, as a rule, contra-indicated. Where there is any special weakness of the heart and circulation, a dry diet is advisable for sake of the heart, apart altogether from the obesity. When a highly nitrogenous dietary is in use, at least three pints of fluid in the form of hot or cold water, or occasionally weak clear soup, should be taken daily, this being taken on an empty stomach, between meals.

To sum up. Every case of obesity must be treated on its merits, remembering always that there are certain broad principles to be followed. The *total amount of food must be reduced*, farinaceous foods in particular being very greatly restricted. The *entire quantity of liquid taken with meals should be very moderate. Suitable exercises*, either in the form of open-air exercises, Swedish movements, or massage, according to the condition of the patient, constitute an important part of the treatment. We have here tabulated the different articles of food which may be taken. The cooking of all the meat foods must be of the simplest, all sauces and condiments being avoided.

Allowed.	Forbidden.
Soups.	
Clear soups in small amount only ; broths not thickened or containing ingredients like rice or barley.	Thick soups — for example, broth, potato, lentil, mulligatawny, oxtail.
Fish.	
All white fishes.	Salmon, herrings, mackerel, sardines.
Poultry.	
Fowls, turkeys, partridges, pheasants, grouse.	Duck, goose.
Meats.	
All lean meats.	Pork, fat, bacon.
Bread-stuffs.	
Stale bread, toast, rusks, unsweetened biscuits, gluten or almond bread (p. 339).	New bread, pastry, cakes, scones.
Fruits.	
Fresh fruits, raw or cooked with saccharin.	Dried fruits, all sweets, jams and marmalade, and honey.
Vegetables.	
All green vegetables, tomatoes, celery.	Potatoes, peas, beans, parsnips, carrots, turnips, beetroot.
Puddings.	
Curds, custards, jellies, stewed fruits made with saxin.	Suet puddings, milk puddings, tapioca, sago, macaroni, cornflour, oatmeal.
Milk and Milk Products.	
Skimmed milk (best diluted), cheese, especially cheddar, American, and Dutch skimmed milk cheese. Butter in strict moderation.	Cream, full milk, cream cheeses, also Gorgonzola, Roquefort, etc.

Fluids.

ALLOWED.	FORBIDDEN.
Tea or coffee, sweetened with saxin.	Cocoa, malt liquor, such as beer, porter, stout.
Hot or cold water.	Sweet wine, such as champagne, port, and liqueurs.
Natural mineral waters—Vals, Vichy, St. Salvier, Apollinaris.	Sweet temperance drinks.
Whisky, in very small amount, or dry natural wines (p. 118).	

REMEDIES TO BE AVOIDED.

A word of caution may be given regarding proprietary remedies extensively administered for the cure of obesity. Most of them are useless, and some of them are dangerous. They are also ridiculously expensive. The composition of many of them has been determined by the British Medical Association. Allan's anti-fat contains potassium iodide, salicylic acid, and bladder-wrack or common seaweed. The price is 6s. 6d. per bottle, the value of the ingredients being 3d. Antipon consists of citric acid, price 2s. 6d. per bottle of 6½ oz., the value of ingredients being 1½d. Russel's anti-corpulent preparation also contains citric acid as its main ingredient, price 6s. for a 12½ oz. bottle, the value of the ingredients being 2d. Thyroid extract should never be taken for the cure of obesity unless under close medical supervision.

HOW TO GET FATTER.

A medical man is sometimes asked by thin, spare subjects, How can I get fatter? In such cases the diet must be liberal, and consist largely of fat-forming foods. On referring to the column on the right-hand side of p. 351, the reader will see the best examples of fat-forming foods. A menu framed on these lines is, as a rule, admirably adapted to put

on flesh and fat. We must recognize, however, that some spare subjects, notably those of a nervous temperament, will not fatten on any diet; and on the whole this is, from their point of view, a matter for congratulation rather than regret.

XX.

TUBERCULOSIS.

AMONGST THE WELL-TO-DO CLASS.

FLUID DIETARY—MAINLY MILK.

A LARGELY MEAT DIETARY.

AMONGST THE WORKING CLASSES.

Directions for Economical Home-feeding.

What Food to buy, and how to cook it.

Meat.

Butter.

Milk.

Cheese.

Eggs.

Oatmeal.

Dried Peas, Beans, and Lentils.

Potatoes.

Fish.

Porridge.

Lentil, Pea, or Bean Soup.

Suet Puddings.

Milk Pudding.

DIET IN TUBERCULOSIS IN CHILDREN.

Preventive Treatment.

Chapter XX.

TUBERCULOSIS.

General Principles—Well-to-do Classes—
Working Classes—Children.

Tuberculosis manifests itself in many forms, the most common being enlargement of glands, pulmonary tuberculosis, and tuberculous affections of the bones and joints, especially in children. Tuberculosis is essentially a *wasting disease*, prominent symptoms being loss of appetite, disturbed digestion, interference with nutrition, and a resultant loss of flesh. Cough and spit, associated in many cases with the spitting of blood, are common symptoms in tuberculosis of the lungs. The essential in treatment is to improve the resistant and recuperative powers of the body by getting the patient to eat properly, and to eat a sufficient amount. The aim in the dietetic treatment is to get the patient to *increase the amount of food so that his weight shall increase and remain stationary at a little in excess of the patient's highest known weight before being affected with tuberculosis.*

There is no hard and fast rule for the dieting in tuberculosis. The disease may show itself at all ages and in many varied forms. The stage and severity of the disease,

and the presence or absence of special complications, have to be considered.

A continual supply of fresh air, with as much sunlight as possible, is the first essential in the treatment of tuberculosis. The patient should, as far as possible, therefore live in the fresh air day and night, irrespective of the weather. This promotes a good appetite, increases the digestive powers, and so enables the full effect of a judicious dietary to be obtained. A further important point is, that breathing should be carried out properly. It is of comparatively little value to put a child or young person who is a mouth-breather on to a proper dietary if the oxygenating power of the blood and tissues is greatly below the normal, from a cause which can be readily removed. Breathing exercises, carried out in a systematic and thorough manner, are of the greatest value in those cases.

The food as a whole has to be increased, special importance attaching to the increase of the *proteins and fats*. As a rough estimate of the extent to which the nutritive material should exceed the normal diet of a non-tuberculous subject, it may be said that the diet in a case of tuberculosis should contain about one-third more. Of this third, the greater part should be given in the form of animal protein, and more especially meat, eggs, and milk. Animal proteins are selected because they have a very special value in the treatment of tuberculosis. The fats are increased by the addition of milk, butter, cream, and yolk of eggs. There is no special virtue in increasing the bread-stuffs and farinaceous foods; on the contrary, special care has to be taken in regard to the quantity of these foods supplied, because of their liability to induce flatulence, which interferes with the digestion and absorption of the protein foods.

The general principles to be followed in the dietetic treat-

ment of tuberculosis are admirably summed up as follows (Bardswell):—

1. The amount of *protein in the ordinary diet should be increased by* 30 *per cent.*, and this increase should be maintained until the disease is obsolete.

2. If the patient is under weight, the physiological diet should also be increased 30 *per cent. in the purely energy-giving foods*—namely, either in fats or carbohydrates, or partly in each.

3. Patients with constitutional disturbance associated with loss of appetite or dyspepsia usually require a somewhat *concentrated diet*, so as to give the comparatively large amount of nourishment in a but slightly increased bulk of food-stuffs.

4. The *meals should be well cooked*, varied, and given, as far as possible, at considerable intervals, and reliance should be placed upon plain food-stuffs whenever possible. Proprietary invalid foods should only be used when ordinary foods cannot be taken.

The diet should be restricted to three good meals a day, with two snacks at suitably separated intervals. Thus, if breakfast be at 9 a.m., lunch at 1 p.m., dinner at 7 p.m., a light snack may be allowed at 7 a.m. and at 4 p.m. It is unwise in such cases to allow further extras of any kind between meals. In many cases, if the patient takes three really good nourishing meals, the snacks are better withheld. If the patient sleeps well, it is better not to give anything by night. If wakeful, a cup of beef-tea or diluted warm milk may be allowed through the night. The food must be nicely prepared, daintily served, and varied as much as possible. It is not, as a rule, advisable to give much fluid at meal times. Where the extra nourishment required is given in the form of milk, not more than one tumblerful should be given with

meals. The quantity of food should be increased as appetite advances. It is noteworthy that a patient in the most favourable conditions of fresh air and sunlight may be able to digest and assimilate an extra diet of from six to eight raw eggs daily, whereas under less favourable conditions not more than one or two eggs daily can be assimilated without deranging the digestion.

AMONGST THE WELL-TO-DO CLASS.

The extra nourishment required can be given either in the form of 3 pints of milk extra daily, or 2 to 3 eggs and 2 pints of milk; or as underdone red meat, 6 to 8 oz. More commonly it is supplied by a judicious combination of these foods. The eggs may be taken raw, or added to milk or soup, or ½ lb. raw meat or meat-juice may be added to the daily dietary.

Suggestions are here given for a diet of an ordinary case of tuberculosis where the digestion is fairly good. Notice that the meat courses should be plentiful, and plainly cooked without sauces, that cream and butter should be given liberally, and that the amount of bread, bread-stuffs, suet puddings, and potatoes, that predispose to flatulence, must be restricted.

Breakfast (8 a.m.).—Two breakfast cups of milk, to be taken with tea, coffee, or cocoa; a little cream; two dishes from the following, a good-sized helping of each: bacon, ham, tongue, potted meat, meat rissoles, fish fried, herrings or sardines, eggs served in any form; a plentiful supply of butter, toast (2 half-slices), 1 roll, scone, or piece of oatcake.

Forenoon.—Milk, ½ pint, and 2 raw eggs.

Midday Meal (1.30).—Fish or entrée; roast meat, hot or cold; grilled steak or chop; roast fowl or game. The meat should be

slightly underdone, and a large helping taken. Vegetable selected from tomatoes, celery, onions, spinach, seakale, French beans, peas, salad vegetables; pudding selected from custards, curds, creams, stewed fruit with cream soufflés, omelets, all eaten with cream; milk, ½ pint (with this meal two half-slices of toast or a dinner roll may be taken).

Four p.m.—Tea, with cream, thin bread or crisp toast thickly spread with butter; one slice of simple cake or biscuits.

Evening Meal (*7 p.m.*)—

Dinner.

1. Soup, 8 oz. (clear consommé).
2. Fish, entrée, or poultry.
3. Meat and vegetable.
4. Pudding as at midday.
5. Savoury, or biscuit and cheese.
6. Milk, ½ pint, two half slices dinner toast or a crisp roll.

Supper.

1. Fish, egg, or chicken.
2. Meat, ham, sausage, or brawn.
3. Cold sweet as at lunch, with fruit.
4. Milk, ½ pint, made with cocoa or coffee.
5. Biscuits, butter, and cheese.

With any tendency to sleeplessness, a cup of beef-tea or a glass of hot milk, Horlick's malted milk, ovaltine, or a teaspoonful of bovril, is a great help.

There are not a few cases of tuberculosis where, owing to weakness of digestive power, the patients cannot take the above dietary. Here we have recourse either to a fluid dietary mainly composed of milk, the food being given often and in small quantities, or to a dietary composed largely of meat, which is often of service in cases where dyspeptic symptoms follow the large mixed meals. Two illustrative dietaries are here given :—

Fluid Dietary—Mainly Milk.

Seven a.m.—Milk, 8 oz.; better given warmed.

Breakfast (*8.30 a.m.*).—Milk, 8 oz., with a teaspoonful of prepared plasmon, and flavoured with coffee or cocoa; a milk gruel made from oatmeal, Scott's oat flour, or barley meal, eaten with cream.

Eleven p.m.—Milk, 8 oz., with one or two raw eggs, or raw meat soup containing 10 oz. soup and ¼ lb. raw beef (for preparation, p. 383, No. 4); soup from good stock thickened with egg or cream and a tablespoonful of prepared plasmon.

Dinner (*1.30 p.m.*).—Chicken essence or restorative jelly soup (p. 413), to which one tablespoonful of plasmon is added, or raw steak, ¼ lb. made into mince with 8 oz. milk, or raw steak, ¼ lb. made into rissoles (p. 298), with 8 oz. milk, or raw meat sandwiches (p. 416), with 8 oz. milk.

Three-thirty p.m.—Egg flip (p. 54), made with 8 oz. milk; thin boiled custard with flavouring; two raw eggs (p. 53).

Five-thirty p.m.—Milk tea, 8 oz., with cream; one sponge rusk.

Dinner (*7.15 p.m.*).—One of the following: A meat-juice home-made (p. 384), or Wyeth's or Leube Rosenthal's meat solution mixed with port or Burgundy; soup with raw meat, as at lunch; savoury custard (p. 403) from beef extract, egg, and milk; milk bovril (ch. xxii.) or other meat extract with plasmon or casein, one tablespoonful; an invalid food made with milk, 8 to 10 oz., fortified with plasmon and eaten with cream.

Nine p.m.—Milky arrowroot or milk gruel with plasmon, or pancreatized cocoa made with milk and plasmon up to 10 oz.

Eleven p.m.—Milk with raw egg, or chicken or meat tea with egg.

If there is difficulty in digesting milk, the fermented forms known as koumiss and kephir are sometimes more easily tolerated. In some cases the milk may require to be peptonized.

Whey also is more easily absorbed, and may be flavoured in various ways and fortified with plasmon or casein, and cream added.

A Largely Meat Dietary.

Six a.m.—Milk, ½ pint.

Breakfast.—Milk, at least ½ pint to 1 pint, fortified with 1 tablespoonful plasmon, and flavoured with coffee or cocoa; two good helpings of meat course—for example, bacon, ham, eggs, fish, meat rissoles, or kidney.

Eleven a.m.—Raw meat soup (which see, p. 383, No. 4), 8 oz.; three raw eggs; glass of hot milk or thin custard (10 oz.).

Lunch (*1.30 p.m.*).—Good helping of fish; good helping of plain slightly cooked meat selected from the following: mince (three minutes'

cooking, which see, p. 417), grilled steak, or fillet of beef, grilled mutton chop; slice of underdone roast meat, sirloin, or rib roast, roast leg of mutton. Avoid vegetables. Custard—Soufflé omelet or cream shape, fortified with plasmon and some stewed fruit and cream; two slices of dry toast; glass of milk, 8 oz.

Four p.m.—Cup of hot milk flavoured with tea, toast and butter, or biscuit and butter.

Dinner (*7 p.m.*).—As at lunch.

Ten p.m.—Cup of raw meat soup.

AMONGST THE WORKING CLASSES.

Here the extra protein required may be got from the cheaper meats and fish, from skimmed milk, and from the pulses. The extra fat may be obtained in the form of butter. The cost of the following dietary works out at about 1s. per day:—

Breakfast.—Bowl of well-boiled porridge, made with half milk and half water; milk, ½ pint; bacon, egg, or fish; bread and butter; cocoa or coffee, made with milk (breakfast cup).

Dinner.—Meat, potatoes, and green vegetable; suet pudding, with jam, treacle, or stewed fruit; milk, ½ pint (skimmed).

Tea.—Tea made with skimmed milk; bread and butter.

Supper.—Soup made from pulses (lentil, pea, bean), or porridge and milk; bread and butter; milk, ½ pint.

A still cheaper dietary may be necessary, and may be framed by using skimmed milk in place of sweet milk, margarine instead of butter, also by using the cheaper meats at 5d. to 8d. per pound, and making more use of lentils and the cheaper varieties of cheese.

The following directions will be found useful for the dietetic treatment of tuberculous patients of the poorer classes living under home conditions. These are taken from Bardswell's admirable work on this subject.

Directions for Economical Home-feeding—for patients

living at home, for instance, those attending out-patient departments of hospitals, etc. It is by no means easy to direct efficiently the dietetic treatment of tuberculous people belonging to the working classes unless they are immediately under supervision—for example, in an institution. In our experience the prescription of a definite diet to consumptive patients among the poorer classes is not satisfactory, as, for the most part, they have not the means at home of carrying out the instructions at all accurately.

We have obtained more satisfactory results in such cases after giving general directions as under :—

You require to take much more food than you did before you became consumptive. Do not hurry over your meals. You will feel satisfied frequently before you have eaten enough, and you must continue to eat even when you do not want more food. Your appetite is no guide as to the amount you need. The best way to find out whether you are eating enough is to weigh yourself every week, always at the same time of day, and in the same clothes. If you have not gained at least one pound during the week, you will know you have not been eating enough.

What Food to Buy, and how to Cook it.—The following is intended to give you a rough idea as to how you can arrange your meals most satisfactorily, and the amount of the various foods you require :—

Breakfast.—Half-pint of porridge, with milk and sugar; a rasher of bacon or a herring, etc.; a round of bread, tea or coffee.

Dinner.—Two large chops, or a large plateful of meat, with plenty of potatoes; a teacupful of milk pudding, or a large slice of suet pudding; half a round of bread, and a glass of milk.

Tea.—At least three rounds of bread and butter with jam, or, if you can afford it, other relish.

Supper.—Half pint of pea, bean, or lentil soup, or ½ pint of porridge, two rounds of bread, with sufficient cheese for both pieces, and a glass of milk.

If you take this diet, you ought to gain at least a pound a week in weight; but if you do not, your best course is to take more milk until your weight increases.

The above diet should cost you about 6s. 6d. per week, but you will require to be careful as to what you buy, and the following notes will probably be of service to you in showing you how to spend your money to the greatest advantage:—

Meat.—If you cannot afford to buy English meat, buy the best foreign, which contains just as much nourishment, and will not cost you more than 6½d. per pound for the best joints. If you cannot afford to buy joints, you must be content to buy "pieces." Make full use of tripe, sausage, bullock's liver, and kidney, which are cheap and nutritious, but do not waste your money on veal or lamb.

Butter.—Buy butter at 1s. per pound, if you can afford it; but if money is scarce, buy good margarine, instead, at 6d. or 8d.

Milk.—You can always get new milk at 1½d. or 2d. per pint, but if you cannot afford to buy much new milk, buy what you can afford, and make up with separated milk, which will cost you 1d. or 1½d. per quart.

Cheese.—Dutch cheese will cost you 4½d. to 6½d., and American 6d. to 7d. Do not buy more expensive cheese, as you will get no more nourishment for the extra cost.

Eggs.—Except during the early summer, eggs are always an expensive form of food, therefore, do not spend more on them than you can help.

Oatmeal.—Oatmeal is one of the very best and cheapest foods you can have. Buy coarse Scotch oatmeal, Provost or Quaker oats, and have a plateful of porridge every morning, and, if you like it, occasionally at supper instead of the soup.

Dried Peas, Beans, and Lentils.—These, like oatmeal, are

most valuable foods for you, and should be used every day, either boiled as a vegetable for dinner, or as a soup for supper. You can buy them at the grocers, the peas and haricot beans will cost you 2½d. per pound or pint, and the lentils 2d.

Potatoes.—These are required every day, and you will save money if you buy at least a stone at a time.

Fish.—Buy fish instead of meat occasionally, for the sake of a change—either cod, plaice, herrings, bloaters, findon or fresh haddocks, or whatever fish is in season and cheap. Tinned salmon at 5d. per tin is a cheap and nutritious food, and makes a good change for supper. The following rough directions for cooking may be of use:—

Porridge.—Stir oatmeal gradually into boiling water, add a pinch of salt, and cook gently, stirring occasionally, for an hour (Quaker and Provost oats take only twenty minutes to cook). Allow two teacupfuls of water and two level tablespoonfuls of oatmeal for each man.

Lentil, Pea, or Bean Soup.—Soak the seeds in cold water overnight. Boil gently in plenty of water until soft, the cooked seeds may be either eaten as a vegetable, or they may be beaten to a fine paste, or, better still, rubbed through a sieve, add a little of the liquid in which they were boiled, and a flavour if required. To form a highly nutritious soup, allow 3 tablespoonfuls of raw seeds for each man.

Suet Pudding.—1. Allow 1 level tablespoonful of dripping, 3 level tablespoonfuls of flour, and a large pinch of baking powder for each man. Mix the dripping thoroughly with the flour and baking powder. Mix the whole into a paste with a little water, form into a roll, flour the surface, tie up tightly in a pudding cloth, and boil for two or three hours. Serve with syrup, gravy, or jam.

2. Or the above paste may be rolled out flat, and jam or

syrup spread upon it. Roll, fold in the ends, flour the surface, tie tightly in a pudding cloth, and boil for two or three hours.

3. Allow 1 level tablespoonful of dripping, 3 level tablespoonfuls of flour, a large pinch of baking powder, and a little sugar and fruit for each man. The fruit may be either currants, figs, or dates, chopped up finely. Mix the flour, dripping, and sugar, add the fruit, and make into a paste with a little water, flour the surface, and tie tightly in a cloth, boil two or three hours. Instead of the fruit, a little syrup and a pinch of ground ginger may be used in the above mixture.

Milk Pudding.—Allow for each person 2 level teaspoonfuls of rice, sago, tapioca, etc., and ⅔ pint of milk and a small teaspoonful of sugar. Put the rice, sugar, and milk, with a pinch of salt, into a pie-dish, and bake slowly in the oven for two or three hours.

DIET IN TUBERCULOSIS IN CHILDREN.

The most common forms of tuberculosis in children are tuberculous peritonitis, enlargement of abdominal glands (*tabes mesenterica*), tuberculous enteritis, glandular tuberculosis, tuberculosis of bone, and pulmonary tuberculosis. The most common source of infection is milk; it also arises from inhalation from contaminated air. The majority of cases occur after two years of age. In the earlier stages the symptoms are often slight, consisting in a general lack of vigour, some degree of wasting, and anæmia. If the temperature is closely observed at this stage, it is found that there is some irregular fever.

Preventive Treatment is especially important in the case of children with a family tendency to tuberculosis. Here

the general circumstances of the child, and also the dietary, must be arranged so as to maintain the healthiest possible condition of the digestive tract. Strict precautions are necessary in regard to the milk supply. If the milk supply is above suspicion, it is no doubt best for the child to take untreated milk—that is, milk which has not been boiled or sterilized. There is no question that the artificial treatment of milk by heat and other methods interferes to some extent with its properties as a food. It does so in all probability by altering some vital ingredient present in fresh milk. Since, however, the danger to the child from the use of artificially treated milk is considerably less than that from the use of fresh milk infected with tubercule, it is, as a rule, advisable to recommend the former. It should, however, be noted that the milk should not be sterilized in the manner sometimes done, by exposing it to a very high temperature for half an hour or more, it should be simply scalded (p. 190).

An abundance of fresh food is an essential in treatment. Milk, eggs, fresh meat, meat juice, fresh vegetables, and fruit should enter largely into the dietary, and an extra amount daily should be insisted upon. Care must be exercised to prevent the immoderate use of farinaceous foods and sweets, which are prone to induce indigestion, and so lower the resistance of the bowels. Lastly, reference may again be made to the importance of fresh air, by night as well as by day, regular meals, and thorough mastication of the food, as being factors of importance in the preventive treatment (see also "Feeding of Delicate Children," p. 218).

XXI.

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Chapter XXI.

COOKERY AND THE PREPARATION OF FOODS.

Cooking of Flesh and Fish—Soups—Beef-teas, etc.—Cooking of Vegetables—Bread-making—Pastry, etc.—Paper-bag Cookery.

Cooking may be defined as the process of rendering food attractive and nutritious by the application of heat through different means, and at greatly differing degrees of temperature. Some people contend that the art of cooking results in the persistent overtaxing, instead of lightening, the labours of the digestive organs; but if some people are fools and "live to eat," that is no reason why the sensible members of the community should not avail themselves of the improvements that the teaching and practice of cookery have introduced.

The reasons for cooking food are as follows:—

1. To render mastication easier by softening tough animal and vegetable fibres.
2. To encourage digestion; this is done by softening the tissues, by bursting the starch envelopes, and by making the food palatable to the taste and pleasant to the eye.

3. To combine the right foods in proper proportion to the needs of the body. Use and wont has established certain well-known combinations of foods which are found to be quite correct chemically—for example, rice is taken with butter and cream, peas are taken with fat bacon, salt fish is eaten with egg sauce.
4. To destroy dangerous bacteria and the eggs of parasites in the food—for example, germs of disease in milk, the eggs of the tapeworm and trichinæ in meat, mutton, and pork.

It will be convenient to consider this subject in the following order :—

1. Cooking of flesh and fish.
2. Soups and home-made beef-teas, etc.
3. Cooking of vegetables.
4. Cooking of flour, bread-making, pastry, puddings.
5. Paper-bag cookery.

COOKING OF FLESH AND FISH.

The chemical composition of meat is modified by cooking, the results varying according to the method of cooking employed. Cooking abstracts a large amount of water, about 20 per cent., also part of the extractives, salts, and fat. A large amount of the extractives are removed by boiling; hence boiled beef is deficient in flavour. The cooking of animal food develops in it new flavours and a greatly improved appearance, two factors of importance in promoting the digestibility of meat. The functions of digestion and assimilation are best carried on at a blood-heat, therefore another object of cooking is to raise the food to a suitable temperature.

The effect of different degrees of heat on albumin is the key-note of all the various culinary methods, which are variations of one another, *depending on whether the meat juices are to be retained or extracted.*

(a) **When the Meat Juices are to be retained** there is first a preliminary case-hardening of the albumin by intense heat; after which, cooking proceeds at a lower temperature, rising in the interior of the meat just to the coagulating point of albumin. This object may be carried out by any of the following methods:—

(1) *Roasting, Grilling, Baking.*—The heat used is radiant heat and hot gas.

(2) *Steaming and Boiling.*—In this the heat is hot water.

(3) *Frying, Wet or Dry.*—This process is carried on by hot oil or hot oil and conduction.

By following these methods we retain all the nutritive sapid qualities within the portion, leaving none of them, or very little, in the medium used.

(b) **When the Juices are to be extracted from the Meat,** the result is a *stew* or a *soup.* Stewing first extracts the juice and then cooks the meat in it, and is thus conducted slowly and over a long time. Soup-making aims at extracting as much as possible, and therefore begins in the cold, never rising above 160 F.

1. *Roasting.*—In this method of cookery the meat is cooked by the radiant heat of a fire from a large glowing surface free from smoke. The meat is exposed to this heat, a few inches from the fire, from five to ten minutes, and is basted with melted dripping, the surface albumin being coagulated to the thickness of a sixpence. After this has taken place the meat is removed one-half to one foot farther from the fire, and the cooking process is continued slowly at a greatly reduced temperature, the meat being slowly cooked in its own juices.

If the heat is too great the hardened case is apt to crack, allowing the juices to escape. To prevent this the meat is basted with hot dripping,

which prevents charring and cracking of the surface. If properly done, this fat does not soak into the meat. Although the surface heat is very great, the heat in the interior of the joint should not be much above the coagulating point of albumin, and any rise above this renders the meat less digestible, the albuminous matters becoming hard and horny. The inside parts of a properly roasted joint are the best for a weak digestion.

This process requires a quarter of an hour per pound for beef and mutton, but longer for veal and poultry. The meat loses weight from expulsion of water—from about 20 to 25 per cent.

2. *Baking.*—Joints of meat can be well cooked in the oven of an ordinary kitchen range or in a gas-cooker, and the results are very similar to roasting. If the heat of the oven is not properly regulated the results are different, the meat being richer, more flavoured, but more indigestible. This is owing to the process being conducted at too high a temperature after the preliminary case-hardening.

3. *Broiling, Grilling, or Brandering.*—This is a similar process to roasting, and is admirably adapted for quickly cooking a chop, steak, kidney, fish, fowl, or mushroom. The object is the same as in roasting—the formation of a surface skin of coagulated albumin, and the retention within this of all the juices of the meat. The effect of the heat on a thin piece of meat seals the surface, but also coagulates the protein throughout, so that the meat is practically cooked at once. This happens when a chop is cooked on a grill; the completeness of the sealing is shown by the fact that the water-vapour produced from the fluids is unable to escape, and causes the chop to assume the puffy form characteristic of good cooking.

The sauce *par excellence* for broiled meat is mushroom ketchup, and the garnish should be a raw vegetable—for example, tomato, lettuce, water-cress, or endive.

4. *Boiling and steaming* consists in cooking meat or fish, either with hot water or steam, with a view to retain in the meat all the flavours. Here, again, the first step is to coagulate a surface layer of albumin by plunging the joint into a large pot of boiling water to which has been added a handful of salt. Salt is added on account of the boiling-point of salt water being higher than that of fresh water. The formation of this hardened case takes about seven minutes; the pot should then be withdrawn and kept at the side of the fire, the temperature not higher than 180° F. This method is not only much more economical, but the meat is very much more tender if the cooking is slowly conducted over a period

of five or six hours. The best method of slow cooking is by steaming the article of food in its own juice; this can be done most satisfactorily in a Warren cooking-pot or bain-marie. If the boiling is carried to excess and the water really boils, the meat is boiled to shreds. In these circumstances the connective tissue has become gelatinized, and the muscle fibre has become tough like leather, and may often be recognized in the fæces.

Boiling Fish.—In the case of fish, if the water is boiling the skin will crack and spoil the appearance, and if fish is put into cold water it has much of its goodness and flavour extracted. The best method, therefore, is to put it into water just below the bubbling point and to put vinegar or lemon juice into the water, as the albumin sooner coagulates if acid is added to it.

Steaming is an excellent way of cooking fish. It retains the flavour and also preserves the shape.

5. *Frying* is boiling in oil, but, as practised in this country, is a dirty and wasteful method, being usually a combination of broiling and scorching. There are two forms.

Dry frying—which is our national form of frying. A shallow frying-pan is used, and the food is either cooked in its own fat or with the aid of sufficient fat to prevent burning. It is only suitable for fatty food like herrings and sausages, but the products of this form of frying are often greasy, and for many persons exceedingly indigestible.

Wet frying or sautéing is, essentially, boiling in oil. For this there is required a deep pan of clarified dripping or of olive oil. If the process is properly carried out, the food is deliciously cooked and absolutely free from grease. The temperature of the fat is important. When fat is placed on the fire and reaches 212° F. (the boiling-point of water), it bubbles and makes a hissing sound, due to a small portion of the water in the fat becoming steam and being got rid of. Fat, however, does not boil until it has reached a much higher temperature. At a temperature of 340° F. a slight bluish vapour is given off, and this is the time when, if a piece of bread be dropped in, it becomes brown in a second or two; on being taken out of the fat, it almost instantly loses its greasy appearance. If the fat gets hotter and begins to boil—a state of affairs to be avoided—it begins to smoke and decompose.

If the object to be fried is coated with egg and bread-crumbs, the crumbs should be very fine, and firmly pressed down, to prevent the grease adhering to the surface and being absorbed by it.

The best substance to use is second quality of olive oil, or roast-beef

dripping; clarified lard should never be used—it is more expensive, and leaves an unpleasant flavour—as the other media for frying are as easily obtained, and are much better. Many specially prepared fats are now on the market. Some are merely beef fat, freed from skin and blood, and melted into cakes; these are used like suet. Others are solidified cotton-seed oil, or purified nut oil. They are excellent for frying purposes, and are economical.

WHEN THE JUICES ARE EXTRACTED.—Stewing and braising are processes by which meat and poultry can be prepared and served in the most tender condition possible.

1. *Stewing* aims at making an extract of nutritive juices of the food, which are then used for cooking. A low, steady heat is wanted; and since nothing is lost in this process, it is one of the most economical ways of preparing food. The meat is chopped into convenient-sized portions, seasoned (if there are bones, they are also broken up and put into the pot); the whole is covered with cold water and a tight-fitting lid put on to the pot, which is placed near the fire, but never allowed to boil. The old saying, "A stew boiled is a stew spoiled," is a true one. If vegetables are to be added, they are best put into the pot after the meat is half done, as the flavours of the vegetables are lost with too continuous cooking. The more slowly the stew is cooked the better it is done. Tough meats are rendered more digestible by the addition of a little vinegar to loosen their fibres and to convert them into acid albumoses.

2. *Braising* is very much the same as stewing. The meat is again slowly cooked in a closed vessel, the meat being just covered with an extract of animal and vegetable juices (stock) instead of water, and by this means the flavour of the meat is improved, the meat becoming impregnated with the flavours. This method is best adapted for foods somewhat insipid in themselves, like veal, poultry, and sweetbreads. At the end of the process the meat should be browned; this is carried out by having a concave lid in which hot cinders can be placed, or it may be done by radiation before the fire.

3. *Boiling.*—This brings us to the consideration of Soups and Soup-making.

SOUPS.

Nutritional Value.—The amount of nutriment to be got from a simple soup is very small. Soup-making proceeds upon the principle of taking as much as possible from the

food materials, the extraction being effected by the use of a considerable quantity of water at a very moderate heat, extending over a long time. A clear soup contains the flavouring constituents and some of the salts of the meat from which it is prepared, also a very small proportion of soluble protein, all the coagulated protein having floated to the top and been removed as a brownish scum during the making; there is also present a small quantity of fat. Most clear soups contain only from 1 to 2 per cent. of solids; thick soups contain a little more, usually up to 4 per cent.

If soup is to be made even moderately nutritious, the soup must simply be used as a vehicle by means of which other food materials can be made use of. The following ingredients are frequently used to thicken soup :—

1. Starchy materials, such as cornflour, barley, rice, and potatoes; also macaroni and vermicelli, which contain a good deal of gluten.

2. The pulses—for example, lentils, peas, beans—which make the most nutritious soups.

3. Eggs, grated cheese, and cream.

4. Purées of meat, chicken, game, and fish.

Soup-making.—In the making of soup the solvent power of the water is increased by the addition of a little vinegar to the water. The temperature is kept at a little below 160° F. for several hours. As vegetables require a much greater heat than this to soften them, they should either be first boiled, and then the meat should be added, or the vegetables can be cooked separately, and only added to the soup when it is almost ready; this preserves the colour best. Flavouring herbs should be put in at the last moment. In all soups made from meat, great care should be exercised in the removal of the fat. This is done by the soup being made the day before it is required, put aside in a basin to

cool, and, when quite cold, the fat carefully skimmed from the top.

Varieties of Soup.—The term "stock" is usually given to the liquid part, to which the nutritious thickening and other ingredients are added.

Stock is the foundation of soups, and, to be successful in soup-making, the manufacture of stock is necessary. There are varieties of stock—that is, white, brown, and fish stock. Of white and brown a first and second stock is made.

White stock is made usually from veal, bone, and remains of poultry and calves' feet. The liquid in which calves' head or fowls have been boiled makes excellent white soup.

Brown stock is best made from beef, but it lacks the gelatinous substance, therefore stock for good table soup (or consommé) should have some bones added—shin of beef or knuckle of veal, vegetables being added to colour it.

Fish stock is made from fish and fish trimmings.

In the making of stock the meat should be lean and as fresh as possible. It should be wiped with a dry cloth and cut into small pieces, the allowance of water being one quart to every pound of meat; but, of course, if the water has been evaporated in cooking, more may be necessary. The meat after cutting up should be allowed to lie in the water to dissolve out any soluble constituent, and then the whole should be slowly heated until boiling point is reached. When the scum thrown up by boiling has been removed, the stock should be drawn to the side of the fire and allowed to simmer. The vegetables should be in large pieces, and be added after the stock has boiled and the scum has been removed—to four quarts of water allow one carrot, one onion, half a turnip, one strip of celery, and about twelve peppercorns. The stock should simmer very gently from five to six hours closely covered, and never be allowed to get cold. Then strain through a hair sieve into a large basin, and stand till cold. When cold the fat must be carefully skimmed off. The meat and vegetables left should be returned after straining into the stock-pot and boiled again for second stock.

"Meat boilings" is the name given to the water in which a joint of meat, fowl, or rabbit has been boiled.

Stock may be made in a proper stock-pot or in a large goblet. The stock-pot should receive all scraps of meat and vegetables that are over from the preparation of other dishes, also any meat boilings. A sufficient quantity of fresh cold water must always be added, and a little salt to throw up the scum.

A stock-pot should be kept slowly boiling, gradually concentrating its contents, and should not stand by the side of the fire in a lukewarm condition. Skim the stock thoroughly once or twice. A few washed egg-shells put into the stock will help to clear it. One whole day is sufficient to boil stock; then strain thoroughly, wash the pan, and set it outside to air. These precautions are necessary to prevent the stock becoming sour from fermentation.

The bones and any pieces of the meat may be put on next day with any fresh scraps. The vegetables are useless once the flavour has all been extracted.

Stock and soup should never be allowed to cool in the sauce-pan, but should be poured into basins and left uncovered. The grease that rises to the top should not be removed before the soup is used, as the covering of fat helps to preserve it. If the stock has to be kept some time, it is best preserved by putting into a sauce-pan and bringing it to the boil each day.

Stock-making.

Brown Stock.—Three lbs. shin of beef, or 2 lbs. shin of beef and 1 lb. knuckle of veal, 3 quarts cold water. *Vegetables.*—One carrot, half a turnip, 2 small onions, 1 stick celery or half a teaspoonful celery seed, a few parsley stalks. *Flavouring.*—One teaspoonful mixed herbs (small), 2 dozen peppercorns and cloves, 1 blade of mace, 2 teaspoonfuls of salt.

Prepare as described above. A darker-coloured stock may be obtained by frying the meat in a little dripping before pouring on the water.

WHITE STOCK.—Three lbs. knuckle of veal, or 2 lbs. knuckle of veal and 1 lb. neck of mutton, 3 quarts cold water. Rabbit or chicken may be used instead of the mutton, and a small ham bone improves the flavour. Use fewer vegetables and flavourings than given for brown stock, and make in the same way.

FISH STOCK.—One lb. of white fish (whiting, haddock, or cod), 1 quart of water. *Vegetables.*—Slices of carrot, half a small onion, 3 sprigs of parsley. *Flavouring.*—Six peppercorns and a very little salt. Cut up the fish and its bones in small pieces, cook with the water, cook with the vegetables and flavourings for twenty minutes, and then strain.

Consommé is a clear soup made from first stock, and served with different garnishes.

Purée is a thick soup made from first or second stock. The thickening may be either meat, game, or vegetables, the substance with which it has been thickened being first rubbed through a sieve.

The next variety of soup is that which is made on the lines of a good Scotch broth, of meat and vegetables, either boiled in stock or in water. This is known in France as *pot-au-feu*, and here the boiled meat is intended to be eaten with or immediately after the soup.

Grand bouillon is a stronger extract than *pot-au-feu.* It is made from meat and vegetables, to which are added bones and connective tissue for the sake of the gelatine. This, when cold and strained, forms a slightly firm jelly, which can be cleared and flavoured in many ways. (This variety is usually "clear soup.") If an extract sufficiently strong to be termed grand bouillon be taken, and to this is added extract or purée of roast meat, fowl, or vegetable, the result is known as a consommé. This form of soup is the most nutritious, because it contains most albumin.

Second Stock for Purées, Gravies, and General Use.

After the first stock is made, the meat and vegetables should be put on again with the same quantity of water, and boiled as before. This has not the fresh flavour of first stock, but is useful for making sauces, gravies, and many soups for which a good stock is not required. Sometimes the meat and vegetables are first fried in a little dripping. This gives the stock a darker colour and a richer flavour.

HOME-MADE BEEF-TEAS, EXTRACTS, AND ESSENCES.*

Meat Infusions or Teas.—Home-made infusions of beef, mutton, veal, and chicken are always in demand for the sick-room. They are to be regarded more in the nature of pleasant, palatable, and stimulating beverages than as foods. Their nutritive value depends entirely on how they are made, but is always low.

Preparation of Meat Infusion or Tea.—This is best prepared by using meat from the buttock, rump, or thick flank in preference to the "shin of beef." In the same way fillet of veal is preferable to the knuckle or neck. For chicken-tea a full-grown fowl should be selected; the legs and dark part of the fowl can be used for soup, while the white portion can be served in some other way. In mutton and veal-tea equal parts of the meats are used; this gives a very delicate flavour. In the process of cooking, the tea must not be allowed to boil, otherwise the juices are not extracted, owing to the insoluble albuminous coating formed on the surface of the meat. In every case care must be taken to insure that all the fat is removed from the surface before serving.

* The patent and proprietary meat extracts are described on p. 141.

Beef-tea.

METHOD 1.—The following recipe gives method of extracting the greatest possible quantity of nutriment: 1 lb. lean juicy beef; 1 pint cold water; 1 small teaspoonful salt. After removing all skin and fat, shred the meat down as finely as possible. Place the shredded meat in a basin with salt and water, cover the basin with a plate, allow to stand twenty minutes. By the end of the twenty minutes the solution is practically a raw-beef juice. Turn it into a clean, lined sauce-pan, heat slowly, and whisk it well until it almost reaches boiling-point; on no account let it boil. Draw the pan to the side of the fire, put on the lid, and allow the beef-tea to simmer as slowly as possible for about fifteen minutes. By this time the liquid will be a rich red brown, and the meat will be white. Strain through a *coarse strainer*, pressing the meat as dry as possible with a wooden spoon. Skim all the fat off carefully before serving. After cooling, the tea will be found to have settled into two layers, a lower layer composed of flocculent particles and an upper layer of brown fluid. The lower flocculent layer consists of the protein, which has been slightly coagulated by the heat. If the tea had passed through a muslin or fine strainer these particles would have been kept back, and the value of the infusion lessened. The upper or fluid layer consists of a solution of the extractives and salts of the meat only.

METHOD 2.—The same proportion of meat and water is used. The meat is prepared in the same way, but is placed, after standing in water for half an hour, in a beef-tea jar, and cooked in a very cool oven for two hours. The jars are strong stone jars, with a strong screw lid, and can be obtained from Dale & Co., Edinburgh. This method of making beef-tea gives the best flavour. It may be too savoury for a delicate palate.

(*Caution.*—After making beef-tea in this way, the jar must not be opened until the contents are cold. If opened too soon the steam rushes up, and it is very apt to scald the cook's face and arms.)

Varieties of Teas.—There are various ways in which beef-tea may be thickened—for example, with tapioca, bread-crumbs, or baked flour—thus adding considerably to the nutritive value. When permissible, the flavouring can be improved by the addition of vegetables and celery seed; or

a muslin bag containing a variety of vegetables can be cooked with the beef-tea and afterwards removed.

1. Thick Beef-tea.

Half-pint of made beef-tea. One yolk of egg.
Salt to taste.

Beef-tea, veal-tea, mutton-tea, or beef essence may be used in this preparation. Warm the beef-tea; this will probably take about fifteen minutes. Beat up the yolk of an egg in a cup, pour the warm beef-tea gradually over it, stirring all the time, and it is ready for serving. Serve with thin strips of toast.

2. Half-pint of made beef-tea. One teaspoonful of arrowroot.
One teaspoonful cold water.

Mix the arrowroot and the water in a small basin until quite smooth. Then add it to beef-tea that is being warmed in a pan; stir well for a few minutes to prevent its becoming lumpy. Then simmer slowly for fifteen minutes. The beef-tea may also be thickened by sprinkling in one teaspoonful of tapioca groût, and simmer by the fire for about fifteen minutes.

3. Beef-tea Gruel.

One tablespoonful fine oatmeal. One gill beef-tea.
One gill cold water or milk. Salt.

Make the gruel (see p. 426). When cooked, add it to the beef-tea; stir them together until quite hot, but do not boil. It is then ready for use.

4. Beef Purée.

Half-pint good beef-tea. Quarter-pound lean juicy meat.

Warm in a pan the beef-tea. Wipe and shred very finely a quarter pound of meat, pound it well, and rub it through a fine wire sieve. Take a cup, make it thoroughly hot, put in the pounded meat, and pour on the hot beef-tea. Stir it up well, and serve at once.

Beef Essence.—One pound of meat will make one gill of essence. Chicken can be prepared in a similar manner.

Prepare meat as in last recipe, shredding it down very finely. The chicken is jointed and meat chopped down finely. Place in a jar with-

out any water, with a pinch of salt; cover with two or three folds of strong greased kitchen paper. Place the jar in a sauce-pan of boiling water, and let it steam slowly from four to five hours. Strain through a coarse strainer, and press the meat well to extract all the juice. This liquid is thus pure extract. When cold, this is in the form of a jelly, and should be served in small quantities.

Meat Juices.—This variety of food differs greatly in nutritive value from the beef-teas and essences previously mentioned. The meat juice is extracted without any heat and under strong pressure, and thus a large portion of the albumin is present. The preparation and value of the proprietary meat juices, such as Brand's and Wyeth's meat juices, are referred to on p. 147.

Home-made Meat Juice is cheaper than the proprietary preparations, and is more valuable on account of its freshness and the absence of preservatives. It contains a relatively small quantity of extractives, and can be given in considerable amounts without causing diarrhœa or thirst. The great drawback to the home-made product is its red colour, which is decidedly objectionable. This can be partially overcome by serving in a red glass or a cup.

1. Raw Beef Juice.

Two ounces best rump steak. One ounce cold water.
Pinch of salt or sugar to taste.

Wipe and shred very finely two ounces of meat, pound it well, and rub it through a fine wire sieve. Pour on the water, cover, let it stand, stirring occasionally, for a couple of hours. The liquid will then be a bright red colour, and should be served in a coloured glass. Strain through a fine strainer, pressing the meat with the back of a spoon. The fluid obtained will contain four to five per cent. of protein.

Meat juice should be made in very small quantities, as it very soon becomes rancid. Another method, such as squeezing the meat in a lemon squeezer, may be tried, but this is wasteful, as the pressure is not sufficiently powerful to extract all the juice.

2. Beef-juice Cooked.

Half-pound rump steak. Salt and pepper.

Grill the lean meat rapidly over a clear fire till cooked. Cut into strips, press out the juice with a lemon squeezer into a hot cup; season to taste and serve.

COOKING OF VEGETABLES.

The methods of cooking vegetables are less varied than those employed in the cooking of meat. In almost all cases the object is to retain in the vegetable as much flavour as possible. Hence *boiling* is, *par excellence*, the method. The mechanical action of the heat is of great importance in the cooking of vegetables. The time required to boil them depends upon their age—young vegetables, as a rule, take about twenty minutes, while older vegetables will require about three-quarters of an hour.

All vegetables should be placed in boiling water, to which salt has been added in the proportion of one tablespoonful to every two quarts of water. This improves the flavour, raises the boiling-point of the water, and thus is more softening for tough cellulose, and helps also to retain the colour. As soon as vegetables are sufficiently cooked they should be drained from the water, otherwise they lose their flavour and become discoloured.

Baking and frying are occasionally the methods, and are fully described under the cooking of meats.

When the flavour is to be extracted from the vegetables, stewing and boiling are the methods employed. A few may be stewed, and almost all may be boiled to make stock for soup.

Celery, celeriæ, onion, and salsify are the most suitable for stewing. Very little stock or water should be used, and the vessel in which they are cooked must be kept closely covered to prevent steam escaping.

Where it is desirable to extract the flavour and salts out of vegetables, as in the making of soup, the vegetables are put on to the fire with cold water and subjected to a long process of cooking.

The following is a good method of preparing a vegetable stock. A few "Vegetable Soups" are referred to in ch. xxii.

VEGETABLE STOCK FOR SOUPS.

2 oz. haricot beans.	1 onion.
2 oz. split peas.	1 carrot.
1 piece of turnip.	½ stick of celery.

Parsley, pepper, salt, 2 cloves.

Boil all the ingredients in 2 quarts of water for three or four hours. Skim well. Strain, and, after standing, pour off the sediment.

This should serve as the basis of vegetarian soups and sauces, and be used in the same way as stock made from meat and bones.

The vegetables and pulses that have been kept back during the straining can again be boiled, and rubbed through the sieve. These make a nice bean or pea soup.

COOKERY OF FLOUR.

Bread-making.—The making of bread is possibly the most important of all cooking processes.

Bread is a mixed food containing fat, protein, salts, sugar, and starch. It does not contain enough fat to be a perfect food, and hence the almost universal custom of using butter with it.

The chemical composition of bread is thus given by Atwater :—

	Water.	Protein.	Salts.
White Bread	35·4	9·5	1.1
Brown Bread... ...	40.0	5.0	1.9

The whole process of bread-making aims at converting the dough (flour and water) into a porous mass. Dough is prepared by kneading together by hand or machinery the necessary proportions of flour and warm water. A pound of bread is made from ¾ lb. of flour by the addition of 25 per cent. of water. The porosity of bread, which distinguishes it from biscuit, is obtained by the disengagement within the mass of carbonic acid gas.

Rice flour boiled is sometimes added in bread-making, causing the bread to become more adhesive and to hold more water. Hence bakers sometimes resort to this means to make their bread heavier when it is sold by weight.

Fresh baked bread is less digestible than stale bread, the moist new bread forming a tenacious mass in the mouth which is not readily penetrated by the saliva and other digestive juices. Stale bread crumbles into small particles and is easily attacked. Similarly, the crust is more digestible than the interior part of the loaf.

Spoiled Bread.—Bread may be unfit for use from being made with adulterated or old flour, sour from bad flour, bitter from yeast, and may be sodden from insufficient fermentation; and it may grow mouldy from exposure to warm, damp air when it is moist.

Varieties of Bread.

Bakers produce various types of loaves, known by different names. The chief difference is the type of crust and the porosity of the bread. The pan loaf is generally the most porous, and consequently makes the best toast.

Toast is bread browned by heat in front of an open fire, the starch being partly converted into dextrin in the process. The additional caramel of flavour and dryness acquired lessen the time of digestion of toasted as compared with fresh bread by about one-third. A slice of bread if cut sufficiently thin toasts dry and crisp throughout, but if thick,

the outer layers are scorched while the mass within may become softer than before toasting.

Dinner Toast.—Another method of presenting bread to people with weak digestion is by giving very thin slices of bread dipped in milk and slowly browned in the oven.

Baked Bread.—Slices of bread put into a cool oven and slowly dried, and very slightly browned. The slow baking transforms the starch into dextrin. The bread is hard and needs a great deal of mastication, and with a plentiful supply of butter makes an excellent food for children. Many rusk biscuits are prepared in this way.

Buttered toast is still another way of serving bread. The crisp toast is buttered when hot, and the fat droplets penetrate it. This is a good method of giving an extra supply of butter, but is indigestible.

Brown Breads.—This is an elastic term, meaning that a certain proportion of bran or germ, or of both, have been added to the flour. It is also applied to bread made from whole-wheat meal. Any bread made with the addition of bran is richer in mineral constituents. Another difference is the amount of water present. The protein of bran converts some of the starch into dextrin, and this keeps the brown bread moist. There is a smaller proportion of carbohydrates in brown as compared with white bread, and a larger amount of cellulose. For this reason brown bread is recommended in constipation.

Of the *patent breads*, the most are of the brown variety. They are made from flours prepared by various patent processes. Some are wholemeal breads, with the bran reduced to varying degrees of fineness. Others contain the germ in various proportions, such as hovis and Frame food meal.

Others are *malted*—for example, bermaline, Carr's, veda, etc. The malting consists in adding malt extract. When the malt extract is mixed with the dough, the latter is ultimately converted into malt sugar and dextrin. This makes the bread keep moist, but its activity is stopped as soon as the bread is placed in the oven, the ferment being destroyed by the heat. Thus malted bread does not aid digestion of other starchy food.

Vienna bread is made from the whitest flour (the patents), fermented with compressed yeast, and milk often added to the dough. The crust is glazed by being subjected to the action of overheated steam before leaving the oven.

Pumpernickel is German black bread made with sour dough; it is somewhat laxative.

Zwieback is a thoroughly dry form of aerated bread which is very wholesome for invalids.

Gluten Bread.—Bread made from gluten flour is useful where there is diabetes, and in some cases of obesity. It is very unappetizing. The best breads contain 40 to 50 per cent. of gluten, but some only contain 16 per cent. of gluten, and the rest starch. It can be toasted like ordinary bread.

Standard Bread.—In 1911 public attention was directed in the columns of the *Daily Mail* to the use of "standard bread" in distinction to the white bread generally in use. It was contended that the milling and sifting should be so conducted that not less than 80 per cent. of the grain should go into the flour instead of the usual 70 to 73 per cent., and that this 80 per cent. should include the germ of the grain at present rejected and also the "semolina" (the commercial name of certain grades of the partly ground flour which are rich in protein). It is such 80 per cent. flour to which the name standard flour is applied, and the bread made from it is called "standard bread." In the course of the agitation there was much loose thinking, and many inaccurate statements were made by lay and medical writers on the subject, the majority of whom overrated the importance of the alterations induced in flour by the ordinary milling method. The agitation has, however, been of distinct value in fixing attention on the modern methods of treatment of wheat, and in showing that this may be detrimental to the interests of the public. Of much greater importance, however, than the question of "standard flour" is the question of the present day methods of bleaching flour, and the addition of so-called "improvers," both of which improve the commercial value of the flour to the miller and baker, and, there is good reason to believe, lessen its value to the consumer. Legislative measures directed to these evils are urgently called for.

Rusks may be regarded as a kind of toast. They are made in much the same way as bread, with the addition of butter and milk, and sometimes sugar. They are twice passed through the oven, which thoroughly dries them.

Biscuits are made from flour, but no yeast is used in the manufacture. They are made from fine starchy flour, and worked into dough, either with water, as ordinary ship biscuits, or with butter, milk, and sugar in the case of table biscuits. All their starch is converted into dextrin, and many good infants' foods are made up largely of biscuit powder. Biscuits contain less water than bread, $\frac{3}{4}$ lb. biscuit being

equivalent to 1 lb. bread. Biscuits are deficient in fat and salts, and are thus not a suitable diet for constant use. Biscuits, claiming to be starch and sugar free, are made for use in obesity and diabetes.

The bread supplied to sailors at sea has to be of the unleavened sort, and takes the form of "*ship biscuits*" or "hard tack." These biscuits are exeeedingly hard and tough, and require soaking before they can be eaten.

Most biscuits if kept long exposed to the air become exceedingly tasteless and soft, though they do not mould.

PASTRY AND PUDDINGS AND CAKES.

These are prepared in innumerable variety from flour, in various proportions, with milk, cream, butter, sugar, eggs, flavouring agents, nuts, and fruits (such as hazel nuts, walnuts, currants, raisins, pineapple, cherries, ginger). The dough is usually raised by baking powders or whipped white of egg; sometimes alcohol or yeast are used.

For puddings a hot fire is used, and the principles of boiling, steaming, baking, and frying are employed, so that the flour is altered by the heat much in the same manner as in the manufacture of bread.

Success in preparing dishes of this class depends more on suitable proportions, manipulation, and proper application of heat than on the materials themselves.

Puddings made with flour may be divided into the following groups:—

1. *Boiled and steamed puddings*, in which flour, suet, baking-powder, and other ingredients are mixed together, and are then cooked by being immersed in rapidly boiling water, or placed in a basin surrounded by boiling water.

   Steamed puddings are lighter than boiled ones, but take longer to cook.

2. *Milk puddings* usually have milk and egg — for example, custard, or milk and a farinaceous grain or powder—for example, rice pudding—or consist of milk, eggs, and grain—for example, semolina pudding.
3. *Fritters*, where fruit or dough of some sort is dipped in a batter of flour and egg, and then cooked in boiling fat. To successfully fry anything coated with batter, the fat must be hot enough to immediately harden the surface of the fritters and thus prevent its soaking in.
4. *Soufflés and omelets* are also types of puddings, but as they do not contain flour, they are referred to in another section (pp. 404–406).

The digestibility of puddings cannot be easily classified. They are rich, and, on the whole, not easily digested, except the "Milk Puddings." Sago, semolina, etc., when well made, are useful in the dietary of invalids.

Cakes, like puddings, are made of many rich things—flour of the best quality, the best fresh butter, eggs, sugar, preserved fruits of different kinds, and almonds. They are mixed in various ways; the simpler ones, when eaten in moderation, are quite wholesome, but rich buttery cakes are not to be recommended for the young, or for the old, or for any one suffering from a weak digestion.

Pastry is a dough composed of flour and butter or fat. "Lightness" is the quality most desired in pastry, and this depends almost entirely upon the amount of cold air in the pastry when expansion takes place in the oven.

The best pastry is, therefore, that which contains the greatest quantity of the coldest air prior to baking. The repeated foldings and rollings increase the air in puff paste, while in short paste the lightness is aided by baking powder.

Cooking of Pastry.—The oven in which it is baked should be hot, for a high temperature is necessary to expand the air or gas, and thus make the pastry light. But pastry, even when well made and light, is a buttery compound, and the high temperature at which it is cooked prevents the whole of the flour being properly cooked, and the uncooked buttery starch is almost always indigestible.

PAPER-BAG COOKERY.

Paper-bag Cookery is the term applied to the cooking of food by means of grease proof paper bags. The method of cooking a cutlet, fillet of beef, etc., wrapped in paper, has long been known as a good way of making the food very tender, but a drawback to its employment has been the liability of the food to acquire a taste from the paper. It is only during the year 1911, after the introduction of grease proof bags that do not taste the food cooked in them, that the method has become popular.

This method of cookery claims to have the following advantages :—

1. **Improvement in the Food cooked.**—The flavour is better, shrinkage is prevented, the nutritive juices are retained. The special advantages of the method are well seen in the case of tough meats—for example, old poultry or game; a "tough bird" will seldom be seen if this method of cooking is employed.
2. **Ease in the House.**—The method saves the necessity of using pots and pans, and of cleaning the oven and cooking utensils. It also prevents the smell of cooking invading a house.

3. **An Economy in Food, Material, and in Fuel,** whether gas or coal.

This type of cooking is very valuable for people who live in flats, and for women or girls living in a single room. All that is required is a small gas oven. The bags take up much less room than an assortment of pots and pans, and the absence of smell of cooking is advantageous. For those living alone a good hot meal can be provided in half-an-hour, and no pots be required, no utensils beyond a plate, knife and fork, and the paper bags.

Again, in the cooking of tough meat, poultry, or game, the paper bag will be found to improve the flavour, lessen the time necessary for cooking, and reduce the shrinkage. In the cooking of somewhat tasteless foods—for example, fish, sweetbreads—the improvement in the flavour is marked. Further, the burning of foods in this process of cooking becomes almost impossible.

As an Economy.—There is no loss of actual food materials, everything being conserved in this method of cooking. If four pounds of meat are put into the bag, four pounds come out; in ordinary cooking from one-sixth to one-fourth of the total weight of the meat is lost. There is also economy in regard to fuel consumed, in cases where cooking is done by gas. When gas cooking is employed the shorter time the foods take to cook, and the fact that several foods can be cooked in the same oven at once, materially reduce the amount of gas consumed.

XXII.

RECIPES.

- Milk.
- Milk Diluents.
- Thirst Quenchers.
- Cheese.
- Eggs.
- Peptonized Foods.
- Invalid Foods.
- Meat Extracts.
- Soups.
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- Jellies.
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- Salads.
- Oysters.
- Vegetarian Dishes.
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- List of Starch-free Puddings.

Chapter XXII.

RECIPES.

MILK.

The monotonous flavour of milk can be altered in the manner suggested below, which is often found very useful for invalids who must take milk and strongly object to its flavour.

MILK AND BAKED FLOUR.

½ pint milk. | 1 teaspoonful castor sugar.
1 tablespoonful lightly-baked flour.

Lightly colour the flour in a baking tin in the oven; then, with a little milk, rub the flour into a smooth paste. Bring the remainder of the milk to the boil and add to the paste; boil it together for ten minutes, stirring constantly.

CINNAMON MILK DRINK.

Boil a sufficient quantity of cinnamon stick with a pint of new milk, to give a pleasant flavour, and slightly sweeten with sugar.

This may be taken hot or cold. If a little brandy is added it will be found very useful in cases of diarrhœa.

MALTED MILK.

1 tablespoonful Horlick's malted milk	½ cup hot water.
	Sugar to taste.

½ cup hot milk.

Mix the malted milk powder to a smooth paste by adding the hot water gradually and stirring all the time; then add the ½ cup of hot milk and sweeten to taste.

A teaspoonful of port or sherry wine may also be added.

MILK BOVRIL.

Make a meat extract preparation as directed on the packages of bovril, lemco, Armour, etc., but prepare with boiling milk instead of water.

MILK TEA.

Warm thoroughly in small china teapot, put in two teaspoonfuls of tea, and just cover with boiling water. Allow to stand for three minutes, then fill up the teapot with boiling milk. Allow this to stand for one minute, then pour off and serve.

MILK COFFEE.

Hot milk may be pleasantly flavoured with a tablespoonful of strong coffee.

MILK POSSET.

1 pint milk.	1 dessertspoonful castor sugar.
1 tablespoonful brandy or sherry.	2 thin slices of bread.
	Pinch of salt and nutmeg.

Cut the bread into squares, place in a bowl, and sprinkle over it the sugar and the pinch of salt and nutmeg. Pour the boiling milk over the bread and allow it to stand in a warm place, covered, for ten minutes. Stir in the brandy and serve.

MILK CEREAL (*pancreatized*).

Milk, 1 pint.	Benger's liquor pancreaticus, 1 teaspoonful (or other peptonizing mixture).
Arrowroot, farina, or baked flour.	
1 teaspoonful sugar.	

Mix the flour into a paste with a little milk, then stir in the cold milk until it is smooth; boil until it thickens, stirring all the time; boil for five minutes longer.

Then add the peptonizing fluid, and stir constantly until the preparation is the consistence of cream; bring sharply to the boil, and continue boiling for five minutes.

WHEY.

To the pint of fresh milk warmed to blood heat (98 to 100° F.) add 2 teaspoonfuls of rennet; set it aside in a warm place for a quarter of an hour, when clotting will have occurred. The clot is then very thoroughly broken up by stirring, and the whole strained through muslin. The whey has percentage composition of water 93, lactose 5, albumin .8, ash .6, fat 3. It is practically an aqueous solution of milk sugar. It is apt to turn sour.

Whey makes a palatable drink, with slightly diuretic and laxative properties. Whey cures, where up to 5 pints of the whey are taken in twenty-four hours, have been established for the treatment of renal and dropsical affections.

Lemon Whey.—Whey can also be prepared from milk by boiling with lemon juice—for example, boil a pint of milk with 2 teaspoonfuls of lemon juice. Strain in muslin; squeeze out all fluid from the curd. The whey can be added to beef-tea, or yolk of egg beaten up in hot water.

Wine Whey.—Whey may be similarly prepared by boiling ½ pint of milk with ½ glass of white wine—for example, sherry—and adding sugar to taste.

MILK DILUENTS.

BARLEY WATER.

(*A diluent for milk.*)

1 oz. pearl barley (Robinson's).	1 pint cold water.

Blanch the barley by putting in a pan on to the fire with enough cold water to cover it; bring it to the boil and then pour the water away. After this put on the barley and ½ pint of water; simmer slowly down to ⅔ of a pint, and then strain.

When used as a diluent for infant feeding a fresh supply must be made twice daily.

BARLEY LEMON WATER.

(*A thirst quencher; a sedative for an irritable bladder.*)

2 oz. pearl barley.	Lemon rind.
1 pint boiling water.	Sugar to taste.

Blanch the barley as above. Pour boiling water over the barley, lemon rind (from 1 lemon), and sugar, and stand beside fire for half an hour, covered over. Strain before using.

RICE WATER.

(*Useful in dysentery and diarrhœa; a milk diluent—infants or adults; a thirst-quenching drink.*)

1 tablespoonful rice.	1 quart water.

Soak 1 tablespoonful of well-washed rice in a quart of water by standing beside fire for three hours; then boil slowly for three hours, and strain.

OATMEAL WATER.

1 tablespoonful oatmeal.	1 pint boiling water.

Mix 1 tablespoonful of oatmeal with a pint of boiling water, and boil slowly for one hour. Add water to make up the quantity after boiling to one pint, then strain.

TOAST WATER.

1 slice crust bread.	1 pint cold water.

Toast the bread very brown and hard, but do not burn it. Break the pieces of toast into a jug of cold water. Let it soak for one hour, then strain and use. The water by this time should be the colour of sherry.

GELATINE JELLY.

(*For Infant Feeding*, *p.* 194.) *This is used in the proportion of 1 tablespoonful to 4 ounces of milk and water.*

1 tablespoonful French leaf gelatine.	½ cup cold water.

Soak 1 teaspoonful of fully broken-up leaf gelatine in half a pint of cold water for three hours. Then stand it in boiling water, which is kept boiling until the gelatine is dissolved.

THIRST QUENCHERS.

APPLE WATER.

2 large apples.	Lemon to flavour.
2 or 3 lumps sugar.	1 quart boiling water.

Peel and slice apples and put them into a jug with lemon and sugar. Pour over the boiling water, and put in a warm place until contents are quite soft. Sieve the apples, and bottle.

A piece of toast well browned and cut up and put into the apple water for about half an hour and strained makes a pleasant drink.

Barley water or rice water mixed with apple water in equal parts and strained also makes a nice drink.

Fruit drinks can also be made from rhubarb, black and red currants, raspberries or gooseberries, in the same way.

BLACK CURRANT DRINK.

1 dessertspoonful black currant jelly.	Juice of a lemon.
2 lumps sugar.	1 teaspoonful rice flour.
	1 pint boiling water.

Put the jelly, sugar, and lemon into a saucepan, and pour over the boiling water. Allow to simmer about twenty minutes and strain. Mix the rice flour in a little cold water and pour into the mixture, and stir over the fire until clear. Put into a cool place until cold.

IMPERIAL DRINK.

½ oz. cream of tartar.	Lemon juice or essence to flavour.
8 lumps sugar.	1 quart water.

Put all into the boiling water, stir well, and allow it to get quite cold.

LEMON SQUASH.

1 lemon.	1 small bottle soda water.

2 lumps sugar.

Squeeze and strain the lemon juice into a glass, add the sugar, and serve while effervescing.

LEMONADE (1).

Rind and juice of 1 lemon.	1 pint water.
8 lumps sugar (or to taste).	1 white of egg.

Melt sugar in the water, add the lemon, and pour over the egg, which must be stiffly beaten.

LEMONADE (2).

Juice of 2 lemons and rind of 1.	6 lumps sugar.

2 pints boiling water.

Strain the juice of the lemons. Put the sugar, and lemon juice, and rind into a basin and pour over the water; strain, and allow it to get cold.

ORANGEADE.

2 oranges.	2 lumps sugar.
Juice of 1 lemon.	1 pint boiling water.

Peel the orange finely and put the peel, sugar, and water in a saucepan. Simmer for ½ hour and strain, and then strain the juice of the orange and lemon into it. Stir and allow to cool. Ice can be served with it.

CHEESE.

Methods of Use in Cooking.

CHEESE OMELET.

3 eggs.	1 tablespoonful cream.
1 tablespoonful grated Parmesan or American cheese.	Flavourings of pepper and salt.

Have the eggs thoroughly beaten; add the flavourings, cheese, and cream. Have ready a hot greased omelet pan, pour in the prepared mixture, and stir over the fire until half set. Fold over the omelet and cook until lightly browned. Serve immediately.

CHEESE FRITTERS.

2 whites of egg.	Flavourings—pepper, salt, cayenne.
2 oz. grated cheese.	

Season the grated cheese, and stir lightly into the well-whisked white of egg. Have prepared a deep pan of boiling fat; drop in small spoonfuls, and fry until nicely browned. Drain off the fat. Serve with fried parsley and grated cheese.

CHEESE BALLS.

2 tablespoonfuls grated cheese.	1 egg.
1 tablespoonful flour.	Flavouring.

Make a paste by mixing the cheese, flour, and yoke of egg together, and add flavouring to taste; then stir in the well-beaten white of egg. Have ready a pan of boiling fat, and fry small balls of this until nicely browned.

EGGS.

Methods of serving raw eggs have been described on p. 53. When cooked alone they can be sent to table plain boiled, poached, scrambled, or baked.

They can be used as thickening for soup or added as custard, as on p. 412 (under "Consommé").

Eggs, mixed with milk and various flavourings, can be served as custards, omelets, and soufflés.

BOILED CUSTARD.

½ pint milk.	A few drops of flavouring—vanilla, etc., or lemon rind, or bay leaf.
2 yolks of eggs and 1 white.	
1 oz. sugar (loaf or castor).	

Rinse out a pan with cold water. Put in the milk and flavourings, and simmer until flavoured, and add the sugar. Strain this on to the eggs, stirring all the time, then return the mixture to pan and stir by side of fire until it thickens. This method is very apt to curdle, and to an inexperienced cook it is better to place the egg and milk, etc., in a jug and stand in the pan of hot water and cook until it thickens.

Two tablespoonfuls of cream, stirred in about five minutes before the custard is allowed to cool, is a great addition.

BAKED CUSTARD.

2 yolks and 1 white of egg.	1 oz. loaf or castor sugar.
½ pint milk.	Flavouring.

Beat up the eggs, add the sugar and the flavouring, and add the milk. Strain into a buttered pudding dish, and bake in a slow oven (thirty minutes) until set. When the oven is hot, place the pudding dish in a tin of water to prevent the custard baking too quickly.

A slice of sponge cake or some sponge cake crumbs sprinkled on the top of the pudding when nearly finished cooking makes a pleasant variety.

CARAMEL CUSTARD.

For the caramel, 2 oz. loaf sugar, 2 tablespoonfuls of cold water.

For the custard, quantities as under custard pudding.

Boil the loaf sugar and cold water together until the fluid becomes a good brown shade, then pour it into a plain mould, and coat all the sides and bottom with the caramel. Prepare the custard as in custard pudding. Strain the custard into the mould, cover with a greased paper, steam very slowly for forty minutes, turn out carefully. A little more caramel sauce may be poured round it.

This pudding can be served hot or cold.

OMELETS.

Eggs may also be advantageously used as omelets, as follows :—

How to make an Omelet.

For an omelet of 2 eggs, break them into a bowl, add salt and pepper, and beat them with a fork for about a minute—not longer, as a rule. When the eggs are sufficiently beaten they "run" off the fork in a homogeneous liquid, without any glutinous appearance. It is not necessary to beat for several minutes, with the idea that the more the eggs are beaten the lighter the omelet. This is a great mistake, as too much beating causes eggs to lose their consistency. It is, however, better to beat too much than too little. Place the pan on the fire to warm it, put in a small piece of butter—about the size of a hazel-nut for an omelet of 2 or 3 eggs. Add the contents of the bowl when the butter steams. If this precaution is taken, the omelet will not catch, as the high temperature of the butter isolates the eggs. It is therefore a mistake to shake the eggs directly they are poured into the pan. But a second or two later the fork must be passed round the sides of the pan to loosen the eggs, and then they are worked in all directions with the back of the fork as if they were scrambled. When they are sufficiently cooked they look, in fact, almost like scrambled eggs; but now the omelet is shaken on to one side of the pan, and with the fork one half is folded on the other and slid on to the dish. The shape of the omelet is thus obtained without difficulty, and the heat of one half just finishes the cooking of the other as it rests upon it.

Sweet Omelets.

Omelet Soufflé (Sweet).

White sugar, 1 tablespoonful.	2 eggs.
Pinch of salt.	A little powdered vanilla.

Take two bowls. Put into one of them 1 teaspoonful of white sugar ; into the other a pinch of salt. Break 2 eggs ; separate the yolks, and drop one yolk at a time into the bowl containing the sugar ; whip them well with a wooden spoon and they become creamy like a mayonnaise. Add a little powdered vanilla to another ½ teaspoonful of sugar, and mix with the yolks. Put the whites of the eggs into the bowl containing the salt, and whip into a stiff froth. Mix with the yolks as lightly as possible, and pour the contents into a buttered dish in the shape of a pyramid. Cover it with sifted sugar, and leave it for three or four minutes on the side of the stove. Then put it into the oven for ten to twelve minutes, turning the dish occasionally to colour it on all sides. Make two or three incisions with a knife, and serve immediately. This omelet must be eaten as soon as it is cooked, or it loses both its shape and its delicacy.

Snowball Eggs.

3 eggs.	1 pint milk.
1½ tablespoonfuls powdered white sugar.	Rind of lemon, or vanilla.
	Sugar to taste.

Place 1 pint of milk in a saucepan on the fire with the rind of a lemon or a little vanilla, and sufficient white sugar to sweeten.

Break 3 eggs, separating the white from the yolk. Put 1½ teaspoonfuls of powdered white sugar on a plate. Beat the whites of the eggs into a stiff froth, adding a small pinch of salt. When sufficiently stiff, add the sugar and mix briskly. Take a teaspoonful of this mixture and throw it into the boiling milk in the saucepan ; turn it three minutes later ; remove it with a skimmer and place it on a dish. Take as many spoonfuls of the white of egg as remain and cook them in a similar manner, three or four at a time. (If the white has been beaten sufficiently stiff, when cooked each spoonful will be a compact mass.) Dress the snowballs in a pyramid on a dish. Pour the remainder of the milk from the saucepan into the yolks of the eggs ; put this mixture into another saucepan on the fire, turn it constantly with a spoon, and let it thicken without boiling. Pass it through a strainer, and when cold pour it over the snowballs in the dish.

Savoury Omelets.

Omelet with Tomatoes.

Break the eggs into a bowl, with salt and pepper; beat them for a few minutes with a fork, place the omelet pan on the fire to warm, add a lump of butter. When the butter steams pour in the eggs. Make little incisions with a fork to let the heat reach the eggs in all parts; pass a knife round the edge of the pan to prevent the eggs from "sticking"; fold one half on the other as soon as they begin to get firm, and shake the omelet on to a hot dish. Pour over it a good tomato sauce.

Bread Omelet.

Put 1 tablespoonful of crumbled bread into a saucepan with ½ gill of cream, salt, pepper, and nutmeg. When the bread is swollen with the cream, break 3 eggs, beat them, and make an omelet.

PEPTONIZED FOODS.

PEPTONIZED MILK.

1 pint milk.	2 teaspoonfuls liquor pancreaticus.
¼ pint water.	

20 grs. (½ small teaspoon) bicarbonate of soda.

Method I.—Allow the milk to stand. Skim off the cream. Dilute the skimmed milk with ¼ pint of water, and heat to a temperature of 140° F. Mix with the warm milk the liquor pancreaticus and 20 grs. of bicarbonate of soda. The mixture is poured into a covered jar, with a tea-cosy over, and left near the fire. Let it stand one hour and a half. Let the mixture boil for two or three minutes to arrest any further fermentative action, which will make the milk unpalatable. Add the cream that was removed, and it is ready for use.

When peptonized by the cold process, described below, the milk has no taste or evidence of the presence of the peptonizing agent, and is especially suitable for dyspeptics.

Method II.—Mix the peptonizing agent in cold water and cold milk as above, and immediately place the bottle on ice without subjecting it to any heat. When needed, pour out the required portion, and use in the same manner as ordinary milk.

Note.—It is sometimes found that the cold process is sufficient, but the warm process is the better of the two.

EFFERVESCENT PEPTONIZED MILK.

Put some finely crushed ice in a glass, and then half fill it with Apollinaris, Vichy, or carbonated water as preferred, and then pour it quickly into the peptonized milk and drink during effervescence. It is agreeable to many patients to put in a little grated nutmeg; or the peptonized milk may be sweetened, or flavoured with a little brandy.

PEPTONIZED MILK GRUEL.

This is an artificially digested milk, and forms a complete and highly nutritious food for weak digestions. It was a favourite preparation of Sir W. Roberts. A thick gruel is made from farinaceous material (see p. 280). To the boiling gruel add an equal quantity of cold milk. It will then have a temperature of about 140° F. To each pint of the milk gruel add 3 teaspoonfuls of liquor pancreaticus and 20 grs. of sodium bicarbonate (or other peptonizing agent). Let it stand covered for two hours in a warm place; boil for five minutes, and strain. Most invalids will take this without the least objection, as the peculiar flavour of predigested milk is quite masked by this process.

Note.—Peptonized gruels are acted upon by the ferment, the starch being turned into sugar, and the albuminoid matters are peptonized. The gruel should be very well boiled, and can be made from any farinaceous article in use, such as oatmeal, Quaker oats, etc.

PEPTONIZED MILK LEMONADE.

Juice of 1 lemon.	1 gill effervescing water.
1 gill peptonized milk.	1 tablespoonful sugar and rice.

Fill a small tumbler one-third full of crushed ice, add the water, lemon juice, and the sugar to the ice, and fill up the glass with milk.

PEPTONIZED MILK PUNCH.

Fill a small tumbler about one-third full of crushed ice, and pour on to it a tablespoonful of St. Croix rum, and half a tablespoonful of brandy; then fill the glass with peptonized milk, stir well, sweeten to taste, and grate a little nutmeg over the top.

PEPTONIZED MEAT.

To ½ a pint of water add 4 ounces of minced meat, and bring gradually to the boil. Reduce the temperature to about 140° F. by adding ½ a pint of cold water, and add 30 grs. of zymine or some other

peptonizing agent, and 20 grs. of bicarbonate of soda. Keep warm for three hours, and the meat will be peptonized.

PEPTONIZED MEAT, BROTHS, AND TEAS.

½ lb. lean beef finely minced.	1 tablespoonful liquor pancreaticus.
20 grs. bicarbonate of soda.	

1 pint water.

Mix all together, and simmer slowly for an hour and a half; when it has cooled down to 140° F. add liquor pancreaticus; keep it covered in a warm place for two hours, shake it occasionally, then strain off the liquid and boil five minutes.

Note.—This has a nitrogenous value almost equal to milk. The tea can be flavoured with celery seed, or vegetables, or thickened with sago, breadcrumbs, etc.

INVALID FOODS.

INVALID FOOD.

1 oz. invalid food.	½ pint boiling milk.

4 tablespoonfuls cold milk.

Mix the food into a paste with 4 tablespoonfuls of cold milk. Add ½ pint milk gradually, which should be almost boiling; keep stirring all the time. Put in a warm place for twenty minutes, then boil altogether for a minute, stirring all the time, and strain if necessary. This can be taken as an invalid food or used in making other dishes.

CUSTARD PUDDING.

½ pint invalid food made with milk.	2 eggs.
	2 teaspoonfuls sugar.

Prepare the food according to the direction on the tin; after it has cooled, add the sugar and the eggs (well beaten). Flavour with nutmeg, cinnamon, or grated lemon rind as desired, and pour into a greased dish, and bake in a moderate oven ten to fifteen minutes. It can be served hot or cold.

BATTER PUDDING.

½ pint invalid food made with milk.	2 eggs and a pinch of salt.

Take the prepared food and let it boil up. When it is cool add the salt and eggs (well beaten). Pour the mixture into a greased basin, cover with greased paper, and steam slowly for half an hour. Do not fill the basin too full, as the pudding will rise. When done, it is firm to the touch. It can be served with sugar, preserves, or meat gravy.

INVALID FOOD JELLY.

½ pint invalid food with milk.
½ oz. French leaf gelatine.
2 teaspoonfuls castor sugar and flavouring.

Make the invalid food. While hot add the gelatine, and stir over the fire until dissolved. Add the sugar and any suitable flavouring—port, sherry, lemon, or vanilla. Pour into a wetted mould until set. Turn out and serve cold.

TO PREPARE PEPTONIZED COCOA AND MILK WITH INVALID FOOD.

Take 1 tablespoonful of the food (¾ ounce) and 1 or 2 teaspoonfuls of cocoa (any good brand). Mix together in a basin and add gradually 8 tablespoonfuls of cold water. Then add slowly 1 pint of boiling milk and water (half and half); set aside for ten or fifteen minutes, then pour into a saucepan and bring to the boil. Sweeten to taste. It is ready when cool. Take half the above quantities for a breakfast cup. The natural digestive principles contained in the invalid food digest the cocoa as well as the milk with which it is mixed.

INVALID FOOD WITH CHOCOLATE.

Prepare the food according to the directions on the tin, then add the chocolate (grated). Those who are not fond of chocolate can have it flavoured with cinnamon; and for this 1 inch or so of cinnamon stick will be enough for a breakfast cup of invalid food; or, if lemon is preferred, a small piece of lemon rind pared off thinly may be added.

INVALID FOOD AND RAW EGG.

Beat up a fresh egg to a froth, add the prepared food gradually, stirring the while. Brandy, sugar, or other flavouring may be added if desired.

Note.—The food should not be hotter than can be sipped comfortably when the egg is added.

ARROWROOT PUDDING MADE WITH PREPARED INVALID FOOD.

1 tablespoonful arrowroot.
2 teaspoonfuls sugar.
A little grated nutmeg.
1 egg.
½ pint invalid food.

Mix the arrowroot with a little cold water, add the prepared food to the mixture while stirring, return the whole to a saucepan, and boil three or four minutes; add the sugar and nutmeg, beat up the egg, and add to the mixture. Pour into a buttered dish and bake in a slow oven.

QUEEN PUDDING MADE WITH PREPARED INVALID FOOD.

½ pint prepared food.
1 oz. butter.
2 eggs.
1 tablespoonful jam.
2 tablespoonfuls castor sugar.
½ pint white breadcrumbs.
Flavour with vanilla or lemon rind.

Mix the breadcrumbs, 1 tablespoonful of sugar, and the butter together in a basin; pour over these the prepared food, and stir in the yolks of the eggs (well beaten) and the flavouring; pour the whole into a buttered dish, and bake twenty to thirty minutes, or until set. Then spread the jam on the top, beat up the whites of eggs to a stiff froth, add to them the remainder of the sugar, pile this on the top of the pudding, and return to the oven until set. Serve hot or cold.

SAGO PUDDING MADE WITH PREPARED INVALID FOOD.

1 oz. sago.
Pinch of salt.
1 oz. castor sugar.
A little grated lemon rind.
½ oz. butter.
½ pint water.
½ pint prepared food.

Put sago into a saucepan with the water and salt, and slowly simmer for from twenty minutes to half an hour. Then add the food, sugar, lemon, and egg (well beaten). Pour into a buttered dish, and bake in a slow oven for about half an hour. Semolina may be used instead of sago if preferred.

MEAT EXTRACTS—BOVRIL, LEMCO, ETC.

EXTRACT SOUP (1).

Make the soup according to directions, and add albumin water (p. 53) made from the white of one or more eggs.

EXTRACT SOUP (2).

Place a beaten-up egg in a bowl, and pour over it a pint of hot extract soup.

MILK BOVRIL (see p. 398).

EXTRACT CUSTARD.

Take "Milk Bovril," and to this add one or two eggs as directed under custards, and a delightfully flavoured dish is prepared.

MEAT JUICE WITH MILK.

¾ lb. lean beef.	1 pint milk.

Beef extract for flavouring.

Pass the steak through mincer, and scrape very fine. This should give about 7 oz. of meat pulp. Mix thoroughly with the milk and pass through a fine strainer. This should give about a pint of fluid of the consistency of cream. Add a teaspoonful of the extract for flavouring.

This preparation can be warmed by standing the vessel in hot water.

STEAMED EGGS.

1 fresh egg.	½ teaspoonful of extract.
1 tablespoonful milk.	Salt to taste.

Mix the milk and extract together, gently drop the egg into it, and sprinkle with salt.

Stand the cup in a saucepan, with sufficient water to come up half way.

Boil slowly for five minutes, and turn on to a slice of buttered toast.

SAVOURY SCRAMBLED EGGS.

1 egg.	1 tablespoonful milk.

Meat extract.

Beat up an egg. Add the milk and meat extract. Melt a little butter in a saucepan, and when thoroughly hot pour in the egg and milk mixture; keep beating with a fork until the egg is set. Serve on slice of hot buttered toast.

SAVOURY VEAL JELLY.

1 pint jellied veal stock.	1 egg.

1 teaspoonful meat extract.

Melt the veal stock, and in it dissolve the meat extract, and beat up the egg. Mix the three ingredients and add salt to taste. Place in a basin, and when cold a nicely flavoured jelly can be turned out.

SOUPS.

CLEAR SOUP OR CONSOMMÉ.

1 quart good jellied stock (see stock-making, p. 379).	8 oz. lean meat (from neck of beef). The whites and shells of 2 eggs.

When stock is cold carefully remove all the fat. Put stock in a well-lined saucepan, add the meat finely chopped or shredded down (as in beef-tea making, p. 382), the shells of the eggs, washed and crushed, and the whites. Whisk all together over the fire until just on boiling—then stop whisking; allow the stock to boil up, and then draw the pan to the edge of the fire; cover it with a plate, and allow it to stand for a quarter of an hour, keeping hot, but not simmering. Strain through a warm, clean cloth into a basin, and repeat the straining until the soup is quite clear; this may have to be done two or three times.

Serving.—Re-heat the soup, season to taste—a knot of sugar added at the last makes the soup sparkle. The flavour may be altered by the addition of a glass of sherry or a dessertspoonful of white vinegar or lemon. This consommé may be served with a variety of garnishes, such as egg, vermicelli or Italian paste, sago or semolina—for example:

I.

Pour a pint of boiling consommé slowly into a basin containing a well-beaten-up egg, stirring briskly all the time. The egg curdles and forms golden threads.

II.

Make a small custard by placing the yolk of an egg, pepper and salt, or a tablespoonful of white stock, in an egg cup; cover over with greased paper, and cook in oven until firm to the touch (about ten minutes). Cut the custard into small dices and add to a soup-bowl of hot consommé.

III.

1 pint consommé.	1 teaspoonful Italian paste.

Into the soup sprinkle the Italian paste, and cook for a few moments before serving.

IV.

1 pint consommé.	1 tablespoonful fine sago.

Wash the sago well, sprinkle into the boiling stock, and cook until the sago becomes transparent (about twenty minutes).

If necessary, add more flavouring.

V.

1 pint consommé.	1 tablespoonful semolina.

Stir into boiling soup, and cook for twenty minutes, stirring all the time. If necessary, add flavourings.

MEAT JELLY.

Meat, veal, or chicken jelly can be obtained by preparing the meat and chicken as in beef-tea No. 2 (p. 382) and serving it cold. A restorative meat jelly may bemade in one or two ways, either from beef with an ox-foot or from knuckles of veal.

RESTORATIVE MEAT JELLY.

1 lb. shin of beef.	1 slice turnip.
1 ox-foot.	2 slices carrot.
1 quart cold water.	Pinch of salt.

Get the ox-foot broken in several pieces, split it between the toes, and remove all the fat and the marrow from the bones; wash thoroughly, and blanch by placing in cold water and bringing to the boil; place in basin of cold water, and scrape thoroughly.

Cut up the beef into small pieces; place it, with the prepared ox-foot, water, vegetables, and salt, in a close-fitting jar (see p. 382). Place jar in the oven, or in a saucepan of boiling water, to cook for seven to nine hours. Slowly open the jar when cooled, strain and skim, and pour into a small dish or bowl. This can be served as a jelly, but is excellent when heated as a soup.

VEAL JELLY.

1 lb. knuckle of veal.	2 thin slices turnip.
1 lb. mutton.	(1 stick celery.)
1 quart cold water.	Pinch of salt.

Slice the veal and mutton thinly and break up the bone, and place in a jar with the vegetables, salt, and water. Cover the jar with a close-fitting lid or several layers of strong paper. Cook in a saucepan of boiling water coming half-way up, slowly, for from four to six hours, or cook in the oven. Open the jar when slightly cooled, strain, skim off fat carefully, mould in small dishes, and serve cold in form of a jelly.

Sweet jelly may be made from calves' feet or from gelatine. The former takes more time and is more troublesome to make than jelly from gelatine. The more delicate flavour repays the labour when the jelly is for an invalid. Both methods, however, are given.

CALF'S FOOT JELLY.

2 calves' feet.	Rind of three lemons.
6 oz. sugar.	1 inch of cinnamon.
Whites and shells of 3 eggs.	4 cloves.
Lemon juice, ¼ pint.	2 glasses sherry.

Water, 2½ quarts.

Wash and blanch the feet and divide in several pieces. (See "ox-foot" recipe, restorative meat jelly, p. 413.)

Simmer the calves' feet slowly in water for from six to eight hours, skimming from time to time. Strain the stock into a basin and measure. There should not be more than one quart of stock ; if there is, boil again until stock is reduced to a quart. When quite cold, very carefully remove all fat from the top. Turn the jelly into a well-lined saucepan, and add finely-cut rind of lemon, the lemon juice strained, the sugar and the flavourings, the whites stiffly beaten up, the shells of the eggs washed and crushed. Whisk all together over the fire until just on boiling, then stop whisking ; allow the stock to boil up well, and draw the pan to the side of the stove, and there stand it for a quarter of an hour. Add two glasses of sherry, and strain through a scalded jelly bag or a scalded linen cloth tied to the legs of a chair reversed. Pour the jelly two or three times through the jelly bag, taking care not to squeeze or shake the contents. The jelly should be clear and sparkling. Mould in glasses rinsed with cold water, and serve cold.

Calves' foot jelly can be served with various flavourings :—

1. Put in no wine, but add a little more cinnamon and cloves.

2. Orange jelly, made by substituting orange for lemon juice.

3. Wine jelly, made by using 3 gills port wine or claret, 1 tablespoonful red currant jelly, and 1 gill of water instead of the sherry wine and lemon juice.

4. Whipped jelly.—Dissolve a pint of any jelly by standing the basin containing it in hot water ; whisk with wire whisk until it becomes a firm, white froth.

In making jellies from gelatine, employ French leaf gelatine and use in the proportion of 2 oz. of gelatine to 1 quart of fluid. All the above described jellies can be made with gelatine, substituting the gelatine for the calves' foot jelly, the method of clearing and serving being the same as above.

VEGETARIAN SOUP.

A good vegetarian stock can be prepared as described on p. 386 ; to this all varieties of vegetable purées can be added.

Brown Vegetable Soup.

2 quarts water.	1 cabbage.
1 oz. butter.	2 potatoes.
1 slice bread.	2 carrots.
2 onions.	1 turnip.

Parsley, salt, and pepper.

Fry a slice of onion in a large saucepan. When it is brown and not burnt, add water, salt, and pepper, and bread toasted, and vegetables cut into small pieces. Boil three or four hours, then rub the vegetables through a colander and boil again for ten minutes, and the soup is ready. If too thick, add a little more water.

Julienne Soup (Vegetarian).

1 quart clarified vegetable stock.	Turnip, carrot, celery, onion.
Mushroom ketchup.	Walnut ketchup.
Salt and pepper.	Sherry, if liked.

Cut the vegetables into fine strips about the size and shape of a small match, and boil them separately until tender, but not broken. Have the stock ready boiling; add salt, pepper, a very little ketchup, and sherry to taste; put in the prepared vegetables, cook for fifteen minutes, and serve.

White Soup.

2 small onions.	2 artichokes.
1 head celery.	1 dessertspoonful flour.
½ pint milk.	1 lb. potatoes.
1 turnip.	3 pints water.

1 oz. butter.

Cut about 2 lbs. weight of any white vegetables; wash and peel and cut in pieces, boil them until soft in the water, salt and butter. Rub them through a sieve or colander, put them back in the stewpan with the milk, and let boil. Put in the flour, mix smoothly with cold water, let the soup boil for ten minutes, and serve with slices of fried bread.

Water Cress Soup.

Wash two bunches of water cress; pluck the leaves and throw into a saucepan of boiling water; after a minute remove the cress, and chop finely. Melt some butter in another saucepan and add the cress. Turn it with a spoon in the butter over a slow fire for a few seconds, and then add hot water sufficient to make the soup.

When the water boils sprinkle in 4 tablespoonfuls of tapioca, grout, salt and pepper, and boil till clear. Beat the yolk of an egg in tureen; add a lump of butter and a gill of cream. Slowly pour the contents of the saucepan into the tureen, stirring constantly in order to avoid curdling the egg.

BEAN SOUP.

A quart of white beans soaked overnight in water and boiled in a sufficient quantity of water, and a little carrot, turnip and onion, and salt. Strain off the water when the beans are soft, and serve the beans as a vegetable, or keep for a bean purée next day. Take the water and use as stock, boiling it with rice, and add a squeeze of lemon, or boil a little piece of sorrel, and salt to taste.

Put the yolk of an egg into the tureen and a little piece of butter. Stir the contents of the saucepan gradually into the tureen, and an excellent soup will be ready.

RAW MEAT COOKERY.

Raw steak can be made fairly palatable in the following methods :—

RAW MEAT.

A ¼ lb. scraped beef can very easily be added to a small cup of beef soup; or ½ lb. scraped meat made into sandwiches, with tomatoes, is an easy way for some patients to take extra nourishment. Cream and the yolk of an egg are the best methods of getting on the necessary fat.

LEAN MEAT CAKES.

The beef should be taken from well-grown animals, and steaks cut from the centre of the round are the best for this purpose. The beef-pulps can be prepared in the following way: All the fat, fascia, and connective tissue and bone are removed, and the meat is placed on a board and is shredded down with a blunt knife. The pulp is then scraped together with a spoon. The result is that all the tough fibrinous parts remain. The scraped pulp is lightly moulded by the hand into cakes about ½ to 1 inch thick, and slowly broiled over a clear fire free from smoke. When cooked, serve on a hot plate with a little butter, and season to taste with pepper and salt. The flavouring may be varied by using Worcestershire or Halford sauce, mustard and horseradish, or lemon juice. A small quantity of dry celery is also permissible. From

4 to 6 oz. of meat is the maximum that can usually be taken at a meal at the outset of the treatment; later 8 to 10 oz. or more may be taken by some patients. Four meals should be taken daily.

RAW BEEF JUICE.

2 oz. best rump steak.	Pinch of salt or sugar to taste.
1 oz. cold water.	

Wipe and shred very finely 2 oz. of meat; pound it well, and rub it through a fine wire sieve. Pour on the water, cover, let it stand, stirring occasionally, for two hours. The liquid will then be a bright red colour, and should be served in a coloured glass. Strain through a fine strainer, pressing the meat with the back of a spoon. The fluid obtained will contain 4 to 5 per cent. of protein.

Meat juice should be made in small quantities, as it soon becomes rancid. Another method, such as squeezing the meat in a lemon-squeezer, may be tried; but this is wasteful, as the pressure is not sufficiently powerful to extract all the juice.

BEEF JUICE COOKED.

½ lb. rump steak.	Salt and pepper.

Grill the meat rapidly over a clear fire till cooked. Cut into strips, press out the juice with a lemon-squeezer into a hot cup, season to taste, and serve.

TRIPE.

Methods of Preparing.—The varieties of tripe known as the "blanket" (because it has a folded appearance), and the dark variety known as the "monk's hood," are best for invalids, on account of their tenderness.

If tripe is properly prepared it is a most delicately flavoured and easily digested article of food, and should be in more constant use than it is at present. It requires, however, very careful cleaning and boiling. In Scotland prepared tripe cannot be purchased at the butcher's, so it is necessary to understand the whole process. Tripe sold in England has generally had a preliminary boiling.

First wash and scrub in several waters and scrape it with a knife, pulling away any pieces of fat from it. Cut it into pieces and put it into a clean saucepan with cold water to cover it, and bring it to the

boil. This is repeated until the water in which the tripe was boiled loses all its heavy smell. This may require to be done four or five times. Then rinse the saucepan well, put in the tripe with cold water to cover it, bring to the boil, and cook slowly for ten to twelve hours. If cooked too quickly the tripe will harden. When sufficiently cooked, it ought to be so tender that it will pull easily to pieces. Pour it out into a basin, and cover it with the liquor in which it was cooked.

The water in which the tripe is boiled should never be thrown away, as it contains a certain amount of nourishment. It is sometimes served as an invalid jelly.

The prepared tripe can be stewed in various sauces for fifteen minutes, and served in one of the following ways :—

1. Tripe stewed in white sauce and onions, and served with sippets of toast.

2. Tripe stewed in a thick tomato sauce, and served with little rolls of bacon and croquettes of fried bread.

3. Tripe heated in a good curry sauce, and served with a border of rice.

4. Baked Tripe.—Grease a small pie-dish, and put the tripe, with thin square pieces of bread and butter, into this, in alternate layers. The last layer should be bread, with the buttered side up. Beat up an egg in a basin until it is frothy; add to it a gill of tripe liquor, and season with pepper and salt. Strain this into the pie-dish, and then wipe round the edge of the dish with a cloth. Let the mixture stand for ten minutes, until it gets thoroughly soaked. Bake in a moderate oven for about fifteen minutes until nicely browned. Serve hot.

TRIPE AND ONIONS.

2 lbs. tripe.	½ pint water.
2 large onions.	1 tablespoonful flour.
½ pint milk.	1 teaspoonful salt and pepper.

Cut the tripe up, put into a stewpan, cover with cold water, bring to the boil, and strain. Replace the tripe, add the milk, water, and salt, boil up, add the onions thinly sliced, and simmer for three hours. Mix the flour with a little milk, put into the stewpan, stir until boiling, and simmer fifteen minutes. Season to taste, and serve.

FRIED TRIPE.

2 lbs. tripe.	¼ pint milk or water.
3 tablespoonfuls flour.	Salt and pepper.

Mix the flour with the milk into a batter; add a little more milk if too stiff. Add the salt and pepper. Cut the tripe up, dip into the batter, and fry, until crisp and brown, in a little dripping. Onions can be served with the tripe if preferred.

SWEETBREADS.

There are two varieties of sweetbread—the "throat" sweetbread (thymus gland) and the "stomach" sweetbread (pancreas). The latter is much more digestible. Lamb's sweetbreads are very tender. This article of food must be nicely prepared, or it is very unappetizing. The difficulty is to clear off all the connective tissue and fat from between the lobules.

Soak the sweetbread in cold water for one or two hours. Then put it into a saucepan with cold water to cover it. Bring to the boil, and boil for five minutes. Then lift it out and place in a basin of cold water to cool it. This preserves the colour of the sweetbread. Then, with great care, remove from it all the fat and skin, pulling them off with the fingers. It is now ready for cooking.

2 sweetbreads.	1 small carrot.
A little meat stock.	1 small turnip.
Stick of celery.	Herbs.
1 small onion.	Seasoning.

Prepare the sweetbreads as above. Braise them for an hour and a half by putting all the ingredients into a saucepan, and cover with a well-fitting lid. Take them out and brown, and serve on a piece of fried bread or mashed potatoes, and serve with sauce.

SAUCE ITALIENNE.

1 oz. flour.	Parsley and onion to taste.
1 oz. butter.	1 bay leaf.
½ pint second stock.	1 gill sherry.

Melt the butter, and fry onion, flour, and herbs until brown. Add the sherry, and allow to boil a few minutes; add the stock, and simmer for one hour. Strain the sauce round.

STEWED SWEETBREADS.

1 sweetbread.	Salt and pepper.
1 gill white stock.	1 teaspoonful rice flour.

1 tablespoonful cream.

Cut the prepared sweetbread into pieces, put into a lined saucepan with the stock, and allow to simmer with the cover on until tender. When done take out and put on to toast and keep warm. Mix the rice flour with a little water, and add it to the stock in the saucepan. Stir over the fire until boiling; boil for five minutes. Add the cream, and season. Pour the sauce over the sweetbreads, and serve.

FATTY FOODS.

RASHERS OF BACON

are finely-cut slices from the back and streaky part of the pig, and can generally be purchased cut in fine slices by a machine. The slices from the back have most lean ; but for young children and old people, where the administration of fat is of some importance, it is best to take slices from the streaky portion.

The rashers may be *fried*, *toasted*, or *baked*. They should always be served as hot as possible, preferably in a hot-water dish, and with squares of bread that have been fried in the bacon fat.

FRIED BACON.

Lay the slices in a cold frying-pan, and cook over a slow fire until the fat is clear and then crisp ; if the bacon is preferred moist, remove before it is quite crisp, and place the bacon on toast, and pour round it the fat that has run into the pan.

MARROW BONES (1).

Have the bones sawn into 3-inch lengths, cover the ends with flour and water paste, and fasten them into a floured cloth and boil in salted water for 1½ hours.

Remove the cloth, crust, and send the bones to table in a dish with a table-napkin. They should be served with dry toast.

MARROW BONES (2).

Prepare the bones as above, scoop out the marrow, season to taste, and place on a half-slice of crisp toast. Serve as hot as possible.

JELLIES.

LEMON PUDDING.

2 eggs.
5 oz. loaf sugar.
1 oz. gelatine.
Juice of lemons or oranges (¼ pint).
Water to make up 1 pint.

Rub the loaf sugar on the lemon rind; take lemon juice, water, gelatine, sugar, and lightly beaten yolk of egg; stir by the side of the fire until the gelatine and sugar are dissolved and the egg sufficiently cooked. Do not let it boil, or it will curdle. Whisk the whites to a stiff froth, and mix lightly into the other ingredients when off the fire. Turn into a wetted mould. Serve with whipped cream.

CREAM JELLY OR BLANCMANGE.

½ pint milk.
½ pint cream.
¼ oz. isinglass, or 1 oz. gelatine.
Rind of lemon.
1 oz. sugar.

Into a wetted saucepan put the isinglass, milk, and lemon rind; place at the side of the fire when the milk is well flavoured and the isinglass dissolved; add the sugar, and strain into a basin; add the cream, and stir until nearly cold; then pour into a wetted mould. Turn out, and serve with a jelly or jam.

CARRAGEEN JELLY OR BLANCMANGE.

1 teacupful carrageen moss (Irish sea moss).
1 quart milk.
1 saltspoonful salt.
Vanilla and sugar or saccharin for flavouring.

Pick and wash the dried seaweed, soak in cold water for half an hour, and tie it loosely in muslin; cook with milk and salt in a double saucepan until the milk will set, and sweeten and flavour. Strain and pour into wetted moulds (small size).

SAUCES.

WHITE SAUCE FOR VEGETABLES, MEAT, POULTRY, OR FISH (1).

1 pint milk.
1 tablespoonful cream (this may be omitted).
2 oz. butter.
1½ oz. flour.
1 small carrot.
1 small onion.
A piece of celery.
Peppercorns.
Bay-leaf.

Cut the carrot and celery into rather large pieces; put them, with the milk, onion, and bay-leaf, into a saucepan, and simmer gently for about half an hour; make up the milk if it reduces while simmering; melt the butter, stir in the flour, and cook for seven or eight minutes without

browning, and when slightly cool, add the milk and vegetables, and whisk briskly until it boils. Simmer for ten minutes, strain through a fine sieve, re-heat, season to taste, and add the cream.

MAYONNAISE SAUCE.

Yolks of 3 eggs.	½ pint salad oil.
½ gill tarragon vinegar.	Salt and pepper.

Break the yolks into a basin, add the pepper and salt, and stir with a wooden spoon until they are well mixed. Then add by drops the vinegar and oil, stirring in the same direction all the time or the egg curdles. The sauce will have a creamy appearance when finished.

TARTAR SAUCE.

2 tablespoonfuls mayonnaise sauce.	1 teaspoonful chopped parsley.
1 teaspoonful mustard.	A small piece of shallot finely chopped.

Mix all well together and slowly heat.

SAUCE HOLLANDAISE.

Melt a quarter of a pound of butter, more or less, according to the quantity of sauce required, throw in a handful of table salt, and whip with a fork until it becomes frothy. Pour into a warm sauce tureen, and serve with boiled fish.

MAÎTRE D'HÔTEL SAUCE.

Put a good lump of butter into a saucepan or earthenware pan on a moderate fire; chop a little parsley and chives, or parsley alone, and add to the butter, with salt and pepper and a dash of lemon. This sauce is poured over a steak or fish, or served in a sauce-boat, and is ready as soon as the butter is sufficiently warmed.

SAUCE AU BEURRE NOIR.

Place a frying-pan on the fire to warm; throw into it a lump of butter; let it brown without burning. When hot, remove the pan from the fire, and pour two tablespoonfuls of vinegar into the hot butter, salt and pepper, and a handful of capers.

SAUCE REMOULADE (COLD).

Mix a tablespoonful of mustard with a tablespoonful of vinegar in a bowl; add four or five gherkins finely chopped. Break the yolks of two

eggs into another bowl, chop a few leaves of tarragon and three shallots, and mix with the eggs; add four spoonfuls of salad oil drop by drop, as if for a mayonnaise, turning briskly with a wooden spoon. Mix the gherkins in the first bowl with the sauce, and serve with hot or cold meats, or boiled fish.

SAUCE RAVIGOTE (COLD).

Boil two eggs hard; mix the yolks to a paste with four anchovies boned and scraped; put them into a bowl with a spoonful of mustard, salt, and pepper; add four spoonfuls of salad or olive oil, turning briskly with a wooden spoon; chop a handful of sweet herbs as finely as possible, and mix them with the other ingredients. The oil should be added very slowly, a small quantity at a time.

HORSE-RADISH SAUCE (COLD).

½ gill white vinegar.
2 hard-boiled eggs.
1 oz. grated horse-radish.
½ teaspoonful salt.
1 teaspoonful castor sugar, or flavour with saccharin.
1 tablespoonful cream.

Boil the eggs hard and remove the whites from the yolks; put them into a basin, and work with a wooden spoon until quite smooth, then add the vinegar gradually, and stir the mixture until it becomes creamy; add the grated horse-radish, salt, sugar or flavouring, then stir in the cream, and serve.

VINAIGRETTE SAUCE.

4 tablespoonfuls salad oil.
2 tablespoonfuls tarragon vinegar.
½ teaspoonful finely chopped gherkin, parsley, and shallot.
Salt and pepper.

Mix all well together.

DUTCH SAUCE.

2 oz. fresh butter.
Yolks of 4 eggs.
½ gill cream.
1 teaspoonful tarragon vinegar.
Pinch of pepper, salt, and mustard.

Put all together into a basin; stand it in a pan of boiling water on the fire, then beat it over the fire until it thickens and looks creamy. Care must be taken to prevent it curdling; if it should curdle, add two more yolks of eggs.

SALADS.

TOMATO SALAD.

Select firm, not over-ripe tomatoes; wipe each tomato, but do not wash them; cut the fruit into chunks in a salad bowl; add a small onion chopped fine.

One tablespoonful of vinegar to two of oil; plenty of salt and pepper.

CELERY SALAD.

Cut a head of celery into small pieces; throw into cold water and strain in a salad basket; mix a tablespoonful of vinegar, two tablespoonfuls of oil, a teaspoonful of mustard, salt, and pepper in a salad bowl; add the celery, and mix well. Beetroot can be added in thin slices.

FRENCH BEAN SALAD.

Boil the quantity of French beans required, cut them in halves, and serve in a salad bowl with the usual oil and vinegar dressing. The beans must be allowed to be cold before they are served.

POTATO SALAD.

Cut the potatoes, when boiled and peeled, into a salad bowl with salt and pepper, and mix with mayonnaise. Sprinkle with capers before serving.

FRENCH BEANS AND TOMATOES.

French beans, boiled and prepared as for French bean salad, can be placed in a salad bowl with chopped parsley and fresh tomatoes cut into chunks; season with salt, pepper, and two tablespoonfuls of oil to one of vinegar.

OYSTERS.

OYSTERS AU NATUREL.

1 doz. oysters.	Lemon.
Cayenne.	Brown bread.
Salt.	Butter.

Open the oysters carefully, so as to preserve as much of the liquid as possible, and leave them in their shells; sprinkle lightly with salt, pepper, and a pinch of cayenne; garnish with parsley, and serve with sliced lemon and thin brown bread and butter.

OYSTERS DEVILLED.

Ingredients as above.

Again sprinkle the opened oysters with a little salt and more cayenne, and add to each a small piece of butter.

Place the oysters on a gridiron over a clear, slow fire until thoroughly heated, then serve with sliced lemon and thin brown bread and butter.

OYSTER SOUP.

1 dozen oysters.
1 pint fish stock or white stock.
1 oz. butter.
1 oz. flour.
Pinch of cayenne.
1 gill cream.
1 egg.
A few drops of anchovy essence.
A squeeze of lemon juice.
White pepper and salt.

Place the oysters in a small saucepan with their own liquor, bring them almost to the boil, then strain. Beard the oysters (that is, remove the piece like a fringe that encircles them), cut them in two, and put them aside for stewing in the soup. Put the beards into a saucepan with the liquor and the stock, and let them simmer for half an hour, to extract all the flavour from them. If the stock is not previously well flavoured, small pieces of the different flavouring vegetables should also be cooked in it. Strain through a fine hair sieve or piece of muslin, and rinse out the saucepan ready for use. First melt in it the butter, being careful it does not brown, add to it the flour, and mix together until quite smooth. Pour on the stock, and stir constantly over the fire until boiling. Skim if necessary. Season to taste with a little white pepper, salt, anchovy essence, and pinch of cayenne. Beat up the yolk of an egg in a basin with the cream, and strain into the soup. When off the boil, stir all the time. Place oysters in the soup tureen, pour the soup over them, and serve.

OYSTER FRITTERS.

1 dozen oysters.
3 oz. flour.
¼ pint warm water.
1 tablespoonful oiled butter.
The whites of 2 eggs.
Frying fat.

Make a batter by stirring the water and oiled butter gradually into the flour; when quite smooth, add the salt, and, lastly, the stiffly whipped whites of eggs. Beard the oysters, dip them in the batter, and fry them in hot fat until golden brown.

SCALLOPED OYSTERS.

6 oysters.
½ oz. butter.
Breadcrumbs.
Pepper and salt.
Lemon juice.

Boil the oysters and their liquor, then remove the beards and strain off the liquor.

Grease china oyster shells well, coat with breadcrumbs, and put 2 or 3 divided oysters into each shell. Season with pepper and salt, and pour over a little oyster liquor. Sprinkle in some more breadcrumbs, and pour some melted butter over the top. Brown in the oven, and serve very hot.

VEGETARIAN DISHES.

GRUEL.

Barley.

1 oz. Robinson's barley.
¾ pint water.
Thinly-cut rind of lemon (a piece).
Sugar to taste.

Simmer the barley, water, and lemon rind for twenty minutes. Strain, and add flavouring to taste. A glass of port wine is a very nice flavouring.

Oatmeal.

2 tablespoonfuls of oatmeal.
1½ pint water, or water and milk mixed.
Salt and sugar to taste.

Allow the oatmeal to stand in water for an hour or longer, stirring occasionally, then pour off the water, and boil this for thirty minutes. Add a pinch of salt, or sugar if preferred. It is much improved if eaten with cream. Nutmeg or ginger can be added if the gruel is taken as a remedy for a chill.

OATMEAL PORRIDGE.

Soak 4 ounces of medium oatmeal in 1½ pints of cold water for some hours. Strain the water into a stewpan, and when boiling add the oatmeal, and salt to taste. Twenty to thirty minutes will sufficiently cook it, but it requires frequent stirring.

HOMINY OR MAIZE MEAL FRITTERS.

Make a well-flavoured hominy porridge. Allow it to get cold; cut the cold porridge into neatly sized slices about one inch thick, sprinkle well with flour, and fry in butter or oil.

HOMINY CHEESE PUDDING.

Cold maize meal porridge.	Grated cheese.

Salt, cayenne, and butter.

Cut the cold porridge into small squares, arrange on a flat dish, and sprinkle well with cheese and flavouring. Put on a few bits of butter, and brown in a hot oven.

BREAD FRITTERS.

Fingers of stale bread are soaked in a little milk flavoured with sugar and nutmeg or cinnamon, dipped in batter and fried in fat.

POTATO AND CHEESE MOULD.

½ lb. mashed potatoes (with butter and milk).	2 eggs.
3 tablespoonfuls grated cheese.	Brown breadcrumbs.
	Pepper and salt.

Mix well together the mashed potatoes, the yolks of eggs, seasoning, and cheese; if not moist enough, add a little more milk. Stir in lightly the whites stiffly beaten. Grease and line a basin with the breadcrumbs, and add the potato mixture, not filling basin too full. Bake for thirty minutes, turn out, and serve hot.

CAULIFLOWER AU GRATIN.

1 well-boiled cauliflower.	4 tablespoonfuls cheese (Parmesan).
½ pint white sauce.	

Breadcrumbs.

Divide up a cold boiled cauliflower, and arrange in a fireproof dish. Add 3 tablespoonfuls of cheese to the white sauce, and pour over the cauliflower. Coat the top with breadcrumbs and cheese, and bake in a moderate oven until well browned.

Cauliflower à l'indienne is prepared in a similar manner. Use much less cheese and breadcrumbs, and add 1 dessertspoonful of curry powder and 1 tablespoonful of cocoanut.

TOMATOES SCALLOPED.

½ pint tomato pulp.
White and brown breadcrumbs.
½ oz. butter.
½ teaspoonful finely chopped onion.
Flavourings—salt, pepper, sugar, nutmeg.

Heat the butter in a pan, and lightly fry the chopped onion, add the preserved tomato pulp, and stir in white breadcrumbs until the mixture reaches the consistency of cream. Add the flavourings, and turn the mixture into well-buttered scallop shells. Cover with brown breadcrumbs and small pieces of butter. Bake for ten to fifteen minutes.

POACHED EGGS WITH CHEESE.

3 eggs.
½ pint white sauce.
Butter.
Breadcrumbs.
Grated cheese.
Pepper and salt.

Line a buttered flat fireproof dish with layer of breadcrumbs. Place on the breadcrumbs 3 lightly poached eggs. Pour over the sauce, thoroughly hot, and sprinkle the cheese and remaining breadcrumbs on the top. Put on a few bits of butter, and place in a hot oven until the top is lightly browned.

CHEESE BALLS.

Whites of 2 eggs and 2 oz. grated cheese (Parmesan).
Flavouring of salt and cayenne.

Flavour the whites with salt and cayenne, and beat into a *very* stiff froth. Stir the cheese in lightly at once. Form the mixture into little balls the size of walnuts; drop at once into boiling fat. Fry for five minutes, and drain well. Serve on a dish paper sprinkled with grated cheese.

CHEESE MOULD.

½ lb. mashed potatoes (with milk and butter).
2 oz. grated cheese.
2 eggs.
Browned crumbs, and flavouring of pepper and salt.

Add to the mashed potatoes the yolks of eggs, the grated cheese and seasoning. Mix well together. Stir into the potato mixture the whites beaten to a stiff froth. Line a greased basin with breadcrumbs, fill ⅔ with the mixture, and bake for about thirty minutes in a moderate oven. Serve at once.

DIABETIC DISHES.

(*In addition many of the Sauces given are suitable.*)

PORRIDGE AND PUDDINGS.

Porridge or *Gruel*, made from *almonds* or *cocoanut*, can be prepared in the following manner :—

A small piece of German yeast (the size of two peas) is dissolved in a little lukewarm water, and added to, and well mixed with 2 tablespoonfuls of ground almonds. The mixture is allowed to stand in a warm place (by the fire) for half an hour or longer. The small quantity of sugar in the almonds is mostly or entirely destroyed by the action of the yeast, and the mixture becomes spongy. It may be sweetened with a trace of saccharin if desired. The consistence will vary according to the quantity of water which has been added. If the consistence is that of custard or rice pudding, the almonds may be eaten with stewed cranberries or other fruit as a pudding.

COCOANUT PUDDING.

Half-ounce of German yeast is mixed in a little lukewarm water with ¼ lb. of desiccated cocoanut powder. The mixture is kept in a warm place for fifteen minutes. Then ½ ounce of butter, a pinch of salt, and a little milk are added. All must be well mixed. The mixture is placed in a pudding-dish, and baked in a moderate oven for twenty or thirty minutes until the surface is brown. This pudding can be eaten warm or cold. It may be taken with custard, and sweetened, if desired, with saxin.

ALMOND PUDDING.

Take 4 ounces of ground almonds. Mix ¼ of an ounce of German yeast with a little lukewarm water. Add the ground almonds to the yeast and water, and mix well. Allow the mixture to stand in a warm place for fifteen minutes until spongy. Beat up one egg in a little milk, and add a little solution of saccharin. Then mix the egg with the ground almonds, place in a pudding-dish, and bake for about fifteen minutes.

Suet puddings or suet and almond pudding, and especially *custard* (made in the old-fashioned way from eggs and milk, and *not* from custard powder), are very suitable. To sweeten the custard or puddings, saccharin may be used.

Suet pudding may be prepared from a milk albumin (pastry flour) obtained from Messrs. Callard and Co. Directions are supplied along with the powder

Sweets for dinner, jelly, ices, creams, etc., almost free from carbohydrates, may be prepared by an intelligent cook from cream, eggs, butter, almonds, nuts, lemon, gelatine, vanilla, wine, and brandy, and sweetened with kristallose, saccharin, or saxin.

GIRDLE SCONES.

½ lb. gluten flour.
½ oz. butter.
½ teaspoonful soda.
½ teaspoonful cream of tartar.
Salt or saccharin to taste.
½ teacupful buttermilk.

Rub butter into the flour and other dry ingredients; make into a soft dough with milk. Form into a scone, or little breakfast rolls, or twists, and bake in oven for fifteen minutes.

SAVOURY EGGS.

3 hard-boiled eggs.
¼ gill cream.
½ oz. butter.
1 tablespoonful Parmesan cheese.
1 small piece of onion, chopped.
Pepper.
Salt to taste.
Mustard.
1 tomato.

Divide the eggs in half; take out the yolks.

Mix together the yolks, cream, cheese, butter, onion finely chopped; pepper, salt, and mustard to taste. Fill the white parts of eggs with the mixture.

Cut six rounds of gluten bread; butter them; on each piece lay a slice of tomato, and on this half of a filled egg. Garnish the dish with cress.

CARRAGEEN JELLY OR IRISH MOSS.

Irish moss is a seaweed, and is collected on the northern shores of Ireland. Its nutritive value is slight; it contains mainly mucilage, and also some iodine and sulphur. It should be well washed and soaked for some hours previous to cooking. The flavour is somewhat peculiar, but delicate, and to some very palatable.

1 oz. Irish moss.
1 quart cold water.
Lemon juice.
Saccharin to taste.

Wash the Irish moss well, and soak it for several hours in cold water. Then put into a saucepan with 1 quart of cold water, and simmer slowly for from four to five hours. Strain, add the lemon juice, and sweeten to taste. Pour into a wetted mould and set aside until cold.

ALMOND CAKE PUDDING.

2 eggs.	2 tabloids of saccharin dissolved in a tablespoonful of brandy.
¼ lb. almond flour.	
¼ lb. butter.	

Warm the butter, beat in the almond flour and the yolks of the eggs, adding the dissolved saccharin. Whisk the whites to a stiff froth ; beat all together. Put into small cake moulds, bake in a quick oven, and serve with a little hot sauce made with dry sherry and saccharin.

Cocoanut pudding can be made in the same way.

STUFFED VEGETABLE MARROW.

Small marrows make an excellent dish, boiled and stuffed with the stuffing of mushroom forcemeat. The marrow should be first peeled very thinly, then cut long-way into three slices ; remove the pips, and fill the interior with the forcemeat. The forcemeat should be made hot before it is placed in the marrow ; if not, the marrow will be cooked before the stuffing is heated through. The marrow should be placed in boiling water and boiled until tender ; this takes about twenty minutes to half an hour.

MUSHROOM FORCEMEAT.

1 lb. mushrooms.	2 hard-boiled eggs.
½ teaspoonful lemon juice.	1 oz. butter.

The mushrooms after being cleaned should be chopped and fried in the butter ; lemon juice should be added before they are chopped in order to preserve the colour. Add two hard-boiled eggs to the mixture, and rub the whole through a wire sieve while hot.

When hot this mixture is moist, but on standing gets hard.

SAVOURY OMELET.

1 teaspoonful chopped parsley.	Herbs, savoury, Pepper, Salt } for flavouring.
3 eggs.	
2 oz. butter.	

Melt the butter in a frying-pan, beat up the eggs thoroughly, add a little pepper and salt, parsley and herb, pour the beaten-up eggs into the frying-pan as soon as the butter begins to frizzle, and with a tablespoon keep scraping the bottom of the frying-pan in every part. Go on scraping until two-thirds of the mixture have become lumpy.

Now lift the pan a little off the fire, and push the omelet into half the frying-pan. When nearly set, hold the pan in a slanting direction in

front of the fire, and as soon as set, slide the omelet from the pan on to a hot dish and serve at once.

This may be varied by addition of a little cooked fish, grated cheese, tomato, ham, crab.

STUFFED TOMATOES.

3 ripe tomatoes.	1 pinch mixed herbs.
½ oz. butter.	2 mushrooms, or a teaspoonful Parmesan cheese.
1 spring onion.	Crumbs of 1 almond biscuit.
½ teaspoonful chopped parsley.	

Pepper and salt.

Cut off the stalks, leaving a hole the size of a threepenny bit. Squeeze out the juice and pips. To the juice and pips add the onion chopped, the chopped parsley, mixed herbs, and the mushrooms or cheese. Melt the butter and fry the mixture. Then add sufficient almond biscuit crumbs to make the whole into a moist paste.

Fill the tomatoes with the mixture until they resemble their original shape.

Put a few crumbs and a little piece of butter on the top of each.

Place the filled tomatoes in a baking dish and bake until tender, and moisten with a little oil or butter. Serve in a dish with fried parsley round.

SWEETBREADS AND VEGETABLES.

For the preparation of sweetbreads, see p. 419. The prepared sweetbreads are first stewed in milk, then rolled in slices of fat bacon, and placed in the oven for a quarter of an hour.

The bacon is then removed; the sweetbreads are cut in slices, and grated Parmesan cheese is shaken over them. They are again placed in the oven and braised in a rich brown gravy.

Served on croûtons of gluten bread, in the centre of which can be placed stewed tomatoes, green peas, fresh French beans, stewed mushrooms.

MUSHROOMS AU GRATIN.

10 mushrooms.	Pepper, Salt, Lemon juice } to taste.
Piece of onion.	Almond biscuit crumbs.
1 teaspoonful chopped parsley.	1 oz. butter.
1 saltspoonful thyme, fresh.	
1 saltspoonful thyme, dried.	

Select 10 cup mushrooms about the same size. Peel the mushrooms very carefully without breaking them; cut out the stalks close down with

a spoon, and scoop out the inside. Peel the stalks, and chop them up with the scooped-out portion ; add the onion, parsley, and thyme. Fry all this in the pan with a little butter. Add sufficient biscuit crumbs to make the whole into a moist paste, and season to taste. Bake in the oven until the mushrooms are quite tender. Serve with some nicely fried parsley round it.

TARRAGON CREAMS.

2 eggs.	¼ pint cream.
Pepper and salt.	2 teaspoonfuls chopped tarragon.

Beat up thoroughly 1 white and yolks of 2 eggs, the cream, and a little white pepper and salt. Add a little chopped tarragon.

Pour the mixture into some prepared moulds with chopped tarragon and truffles, and stand the moulds in a stewpan of boiling water reaching to three-quarters height of the moulds.

Let the water boil, then poach for about twenty minutes at the side of the fire till the creams are set. Turn out on a warm dish and serve with sauce hollandaise round them.

FISH ROE SOUFFLÉS.

Take six roes of fresh herrings, blanch and pound them ; then flavour with salt, pepper, pounded mace, and nutmeg. Add ½ ounce butter and yolks of 2 eggs well beaten. Stir the whites of 6 eggs beaten to a stiff froth with the roes, and bake in ramekin cups for five minutes. Serve at once.

LIST OF STARCH-FREE PUDDINGS.

Curds.	Jellies.
Custards.	Blancmange.
Soufflés.	Honeycomb cream.
Omelets.	Stewed fruit.
Creams.	Fools.
Méringues.	Macédoines of fruit.

Compôte of fruit.

XXIII.

APPENDIX.

TABLES GIVING APPROXIMATE COMPOSITION OF VARIOUS FOOD PREPARATIONS.

I. Milk combined with Cereals.
II. Peptone Preparations.
III. List of Malted Foods.
IV. Meat Extracts.
V. Meat Juices.

PROPRIETARY FOODS.

I. Milk combined with Cereals.

	Water.	Protein.	Fat.	Carbohydrates.		Ash.	Remarks.
				Soluble.	Starch.		
Allenbury's No. 2 Food....	3.9	9.2	12.3	72.1	...	3.5	A malted meal and No. 1 Food.
Horlick's Malted Milk.....	2.5	15.4	8.8	69.2	0.1	3.8	Desiccated milk, wheat flour, barley, malt, and bicarbonate of soda.
John Bull No. 1 Food......	3.9	21.0	11.8	54.2	...	5.3	Maltose, 21.3; lactose, 29.4; dextrin, 3.5.
Loeflund's Cream Emulsion	24.3	8.2	15.3	49.4	...	2.6	Made from milk and malted wheat extract.
Maltico........................	1.6	15.1	17.1	...	63.0	2.9	Contains milk and malted cereals; no starch.
Manhu Infant Food.........	8.8	8.7	5.6	...	75.9	1.0	Desiccated milk and malted cereals; much starch.
Milo Food....................	3.8	14.3	5.5	58.9	15.3	2.0	Desiccated milk, with maltose and dextrins, 27 per cent., and cane sugar, 25 per cent.
Theinhart's Infantina.......	5.0	16.1	5.0	53.6	16.7	3.4	Desiccated milk and malted cereals, lactose and cane sugar.
Theinhart's Hygiama.......	4.7	21.2	10.0	49.1	11.3	3.5	A richer food; contains cocoa and cocoa butter.

II. Approximate Composition of Peptone Preparations.

	Water.	Meat Proteins.	Proteins, Albumins, and Peptones.	Extractives and other Matter.	Salts.	Remarks.
Antwerler's Peptone	6.9	3.2	74.6	1.7	13.0	
Armour's Wine of Peptone	83.0	...	3.0	12.9	1.1	
Benger's Peptonized Beef Jelly	89.0	...	7.1	2.2	0.8	Served in glass jars.
Brand's Beef Peptone	84.6	...	7.0	...	1.4	Made from beef, mutton, veal, and chicken.
Camrick's Liquid Peptonoids	5.4	...	24.0	65.0 (chiefly sugar)	5.2	Made from beef, meat, and milk; nutritive value largely due to carbohydrates.
Camrick's Peptonoids	2.1	12.2	4.0	77.0	4.5	
Darley's Fluid Meat	25.7	...	30.6	30.1	13.5	
Denaeyer's Peptone	78.4	...	...	...	...	
Fairchild's Panopeptone	81.0	...	3.0	15.0	1.0	Non-nitrogenous substances, chiefly sugar.
Kemmerich's Meat Peptone	33.3	1.1	47.1	10.2	7.7	
Koch's Meat Peptone	40.1	1.4	34.7	16.7	6.8	
Leibig's Peptone	31.9	...	33.4	24.6	9.9	
Mosquera Beef Meal	...	48.0	29.0	13.0	...	
Savory and Moore's Fluid Beef	27.0	...	8.1	52.7 (fat)	12.1	
Somatose	14.2	...	62.2	2.6	5.3	
Valentine's Meat Juice	59.0	...	6.6	22.7	11.5	

III. List of Malted Foods.

A. *Starch little Altered.*

T. and T. Food.
Nicholl's Food of Health.
Triticumina.
Worth's Perfect Food.

B. *Starch partly Converted.*

Allenbury's No. 3 Food.
Cheletine's Infant Food.
Coomb's Malted Food.
Hovis Babies' Food No. 2.
John Bull No. 2.
Kufeke's Infant Food.
Moseley's Food.

C. *Starch completely Converted.*

Cheltine Maltose Food.
Diastased Farina.
Horlick's Malted Food.
Hovis Babies' Food No. 1.
Mellin's Food.

IV. Composition of Meat Extracts.

	Water.	Proteins.	Extractives.	Nitrogen Free Substances.	Salts.
Armour's Extract	24.3	16.0	20.5	20.0	19.0
Bovril	39.5	9.1	34.1	1.2	13.5
Bouillon Fleet	61.9	11.8	9.8	3.8	12.5
Brand's Beef Bouillon	36.2	9.5	19.3	19.7	15.0
Brand's Essence	87.1	10.4	1.0	...	1.3
Hipi (mutton preparation)	35.0	38.0	16.0	1.5	8.4
Lemco	17.8	16.4	38.1	6.0	21.5
Liebig's Extract	20.0	...	55.7	0.9	24.0
Mason's Essence	77.0	3.0	7.4	2.9	9.5
Oxine Extract	62.9	13.0	4.5	...	19.6
Oxo	38.1	18.9	20.3	5.3	17.3
Villing Beef Essence	90.6	3.6	1.8	2.4	1.4

V. Composition of Meat Juices.

	Water.	Proteins.	Extractives.	Salts.
Armour's Beef Juice.......	74.1	8.3	9.5	7.5
Armour's Soluble Beef....	23.0	33.3	13.4	13.2
Bovinine......................	81.0	13.9	3.4	1.0
Bovril Meat Juice..........	52.0	7.2	14.0	5.9
Brand's Meat Juice........	59.1	15.4	16.5	8.8
Burgoyne's Meat Juice....	49.5	13.0	8.1	14.2
Esco Beef Juice............	52.4	7.6	5.9	20.3
Lipton's Fluid Beef........	42.9	22.1	18.7	16.2
Liquor Carnis...	56.0	6.9	5.0	3.5
Puro	36.6	30.3	19.1	9.7
Valentine's Beef Juice.....	60.3	0.5	29.1	11.3
Vitalia's Meat Juice	66.5	21.0	6.0	6.5
Wyeth's Meat Juice........	44.8	38.0*	...	17.1

* Including Extractives.

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THE END.

GGH.
8 III '09